INL/EXT-09-16286

2009 UK/US Nuclear Engineering Workshop Report

April 2009

The INL is a U.S. Department of Energy National Laboratory
operated by Battelle Energy Alliance

INL/EXT-09-16286

2009 UK/US Nuclear Engineering Workshop Report

April 2009

Idaho National Laboratory
Idaho Falls, Idaho 83415

http://www.inl.gov

Prepared for the
U.S. Department of Energy
Office of Nuclear Energy
Under DOE Idaho Operations Office
Contract DE-AC07-05ID14517

UK/US Nuclear Engineering Workshop Report

April 20-21, 2009
Washington D.C.

Idaho National Laboratory

EPSRC
Engineering and Physical Sciences Research Council

Executive Summary

This report summarizes the 2009 UK/US Nuclear Engineering Workshop held April 20–21 in Washington D.C. to discuss opportunities for nuclear engineering collaboration between researchers in the United States and the United Kingdom.

The workshop identified five key driving requirements for collaboration:

- Extending the life and ensuring the health of the fleet of current reactors
- Stabilizing the current fuel inventory
- Bringing GEN-III+ plants online
- Bringing advanced reactors online
- Closing the fuel cycle.

Attendees from national laboratories and universities in both countries discussed potential areas for collaboration and identified six engineering categories that guided the structure of the workshop:

- Fuel Technology
- Reactor Materials Performance
- Reactor Design, Operations, and Monitoring
- Spent Nuclear Fuel and Waste Management and/or Post Operation
- Decontamination and Decommissioning
- Safety, Security, and Safeguards.

Smaller groups consisting of researchers from each of these categories discussed specific areas for collaboration, including the needs, capabilities, and opportunities in each nation that could benefit from collaborative research efforts. Areas for potential collaboration ranged from modeling and simulation projects to instrumentation and control system design projects.

The main goal of the workshop was to foster individual collaborations between British and American researchers from each group and that these would develop on a case-by-case basis. In several months, the chairs will contact participants to assess the workshop's effectiveness in facilitating collaboration.

ACKNOWLEDGEMENTS

The 2009 U.K./U.S. Nuclear Engineering Workshop was organized by the U.K. Engineering and Physical Sciences Research Council and Idaho National Laboratory (INL). Special thanks are extended to the workshop organizers:

- Dr. Steve Elsby, U.K. Research Councils Energy Programme, Workshop Chair
- Richard Rankin, INL, Workshop Co-Chair
- Naomi Webber, U.K. Research Councils, U.S. Office.

In addition, the workshop organizers thank the staff of the British Embassy in Washington, D.C., for providing support for the workshop, INL facilitators Lori Braase and Bryan Parker, and the American Geophysical Union for hosting the event.

CONTENTS

EXECUTIVE SUMMARY iv

ACKNOWLEDGEMENTS v

ACRONYMS viii

1. Introduction 1

2. Summary of Proceedings 1

3. Summary of Results 2
   - 3.1 Fuel Technology 3
   - 3.2 Reactor Materials Performance 3
   - 3.3 Reactor Design, Operations, Monitoring, and Safety 4
   - 3.4 Spent Nuclear Fuel and Waste Management 5
   - 3.5 Decommissioning and Decontamination 7

4. Recommendations and Path Forward 8

Appendix A Workshop Materials 1

Appendix B Attendee Survey Results 3

Figures

Figure 1. Extending the life and health of current reactors is a driving requirement for collaboration. 1

Figure 2. Workshop participants identified five areas for collaboration. 2

Figure 3. Fuel fabrication and performance are important areas for potential collaboration. 3

Figure 4. The next generation of reactors will require materials that can withstand high temperatures and extreme conditions. 4

Figure 5. Reactor design, monitoring, operations, and safety are also potential areas for collaboration. 5

Figure 6. Participants worked together to identify potential areas for collaboration. 6

Figure 7. Working groups created important opportunities for networking and discussion. 7

ACRONYMS

ATR	Advanced Test Reactor
CMSN	Computational Materials Science Network
D&D	Decommissioning and Decontamination
GEN-III+	Generation Three Plus (nuclear plants)
I&C	instrumentation and controls
INL	Idaho National Laboratory
NDA	Nuclear Decommissioning Authority (U.K.)
NEA	Nuclear Energy Agency
NNL	National Nuclear Laboratory (U.K.)
PWSCC	primary water stress corrosion cracking
UK	United Kingdom
US	United States

UK/US Nuclear Engineering Workshop Report

1. Introduction

On April 20 and 21, 2009, researchers and policymakers from the United Kingdom (UK) and the United States (US) met in Washington, D.C., to discuss nuclear engineering capabilities, needs, and potential avenues for collaboration between the two nations.

The workshop identified the following five key driving requirements for nuclear engineering research and collaboration between the U.K. and the U.S.:

- Extending the life and ensuring the health of the fleet of current reactors
- Stabilizing the current fuel inventory
- Bringing GEN-III+ plants online
- Bringing advanced reactors online
- Closing the fuel cycle.

Figure 1. Extending the life and health of current reactors is a driving requirement for collaboration.

The workshop was designed to stimulate collaboration that will meet these driving requirements. This report summarizes the proceedings of the two-day workshop, lists the results of these proceedings in six technical areas, and presents a recommended path forward for future collaborations.

2. Summary of Proceedings

The conference convened with opening remarks from Steve Elsby, Research Councils Energy Programme (UK) and Dave Hill, Idaho National Laboratory, (US). During introductions, attendees were encouraged to list the individuals that may provide opportunities for future collaborations. They were then given time to network with those identified on their lists. A brainstorming session followed to discuss and identify the categories of nuclear engineering research that would guide the structure of the workshop. The group identified the following categories:

- Fuel Technology
- Reactor Materials Performance
- Reactor Design, Operations, and Monitoring
- Spent Nuclear Fuel and Waste Management and/or Post Operation
- Decontamination and Decommissioning
- Safety, Security, and Safeguards.

The attendees also identified several cross-cutting areas and issues that affect all six of categories in the previous list. Collaborations in these areas can assist all of nuclear engineering. The cross-cutting activities are:

- Life Extension & Licensing
- Instrument and Controls

- Economic Issues including Comparative Energy Study (other energy sources)
- Materials Development and Testing
- Modeling and Simulation (Cross-cutting)
- Public Understanding of Risk
- Skills, Training, and Education
- Mechanistic Understanding
- Regulatory Frameworks and Support of Safety Case Development.

Following the identification of research categories and cross-cutting areas, workshop facilitators Bryan Parker and Lori Braase provided instructions for a "gallery walk," a group technique to encourage individual information gathering and ad hoc small-group discussion. The exercise focused on the nuclear engineering research categories, and the result was a list of gaps and needs for each nation and a list of attendees interested in collaboration (see Appendix A).

Figure 2. Workshop participants identified five areas for collaboration.

Following the gallery walk, groups were formed for each research category to focus on specific research capabilities, needs, and opportunities for collaboration. The workshop was then adjourned until Tuesday morning.

Tuesday morning sessions continued the research discussions for each collaboration group. These sessions included prioritizing key collaborations and filling in "action" templates to document opportunities, needs, and areas of strength. The contents of these templates are summarized in Section 3 and presented in more detail in Appendix A.

Following lunch, Paul Howarth, National Nuclear Laboratory (NNL, UK), discussed market opportunities in the UK. Finally, each collaboration group prepared and presented the key collaborations it developed.

Steve Elsby closed the workshop with a discussion of the path forward for collaborations between the two nations.

3. Summary of Results

This section summarizes the results of the meetings between the collaboration groups, which were organized according to the categories for nuclear engineering research that were identified by the workshop attendees on Monday morning.

3.1 Fuel Technology

The Fuel Technology area consisted of four groups in which attendees identified capabilities, areas of need, and steps towards collaboration. These subgroups included:

- Modeling and Simulation of Fuel Fabrication
- Experimental Verification of Fuel Fabrication
- Modeling and Simulation of Fuel Performance
- Experimental Verification of Fuel Performance.

The **Modeling and Simulation of Fuel Fabrication** group determined that an opportunity exists in this area to use modeling to explore well-defined *n*-dimensional variable space to find critical combinations of variables. Multiscale, multiphysics models can be used to address or predict particle morphologies and flow and packing characteristics. Needs include development of non-ceramic fuels and assistance with sintering models. The next step is to identify a funding stream.

Figure 3. Fuel fabrication and performance are important areas for potential collaboration.

Opportunities for collaboration in **Experimental Verification of Fuel Fabrication** include validating morphology changes, validating process models, and testing predictions of porosity and mechanical properties as well as other fuel fabrication properties.

In the area of **Modeling and Simulation of Fuel Performance**, the group identified extensive programs currently underway that A US/UK collaboration could contribute to by coordinating and raising awareness of these programs. The next steps in this collaboration include: (1) developing and maintaining an email list, (2) attending meetings scheduled on May 20 between Robin Grimes and Jim Tulenko to continue forming collaborations, and (3) using the Computational Materials Science Network (CMSN) and the Nuclear Energy Agency (NEA) to coordinate with other entities.

The **Experimental Verification of Fuel Performance** group identified Idaho National Laboratory's (INL's) Advanced Test Reactor (ATR) fuel performance experiments as a potential opportunity for collaboration. The next steps are to share data from previous experimental results and formulate new experiments that meet the needs of both nations.

3.2 Reactor Materials Performance

The **Reactor Materials Performance** area was also split into four subgroups:

- Irradiation Embrittlement
- Materials Library
- High-Temperature Structural Materials

- Primary Water Stress Corrosion Cracking (PWSCC) and Irradiation.

Each of these groups assessed opportunities, needs, and next steps.

The **Irradiation Embrittlement** group identified three potential opportunities for collaboration: (1) life extension, (2) provision of U.S. facilities, and (3) expansion of multiscale modeling basic physics. The needs identified by this group include defining the scope and money. The group coordinators agreed to define a working group as the next step towards collaboration.

The **Materials Library** group determined that combining the US/UK knowledge to create a database of materials and characterization properties was their prime opportunity for collaboration. The users of such a database will likely come from the fuels development and waste processing projects. As such, the group determined that the next step would be to involve members of the Fuel Technology area and the Spent Nuclear Fuel and Waste Management area.

The group assessing **High-Temperature Structural Materials** discussed several collaborative opportunities: (1) overlaps with fusion; (2) potential access to facilities, including irradiation; (3) fabrication processes; (4) life extension; and (5) potential for links with conventional power industry's interest in high-temperature materials. As they move forward, this group will (1) define the scope in terms of understanding the combined effects of stress, temperature, and radiation on structural materials; (2) pinpoint other needs; and (3) define funding. The group coordinators determined that the next step would be to define a working group.

Figure 4. The next generation of reactors will require materials that can withstand high temperatures and extreme conditions.

Finally, the **PWSCC and Irradiation** group examined the possibilities that US facilities might have for irradiation and post testing analysis impact of cold work, mechanistic understanding, etc. The group agreed that their primary needs include defining scope, needs, and funding. The next steps involve collaboration with the Waste Management area and the group coordinators defining a working group.

3.3 Reactor Design, Operations, Monitoring, and Safety

The **Reactor Design, Operations, Monitoring, and Safety** area was divided into five subgroups. These subgroups also identified capabilities, areas of need, and steps towards collaboration. They included:

- Uncertainty Quantification
- Nuclear Data Generation
- Instrumentation and Controls (I&C)

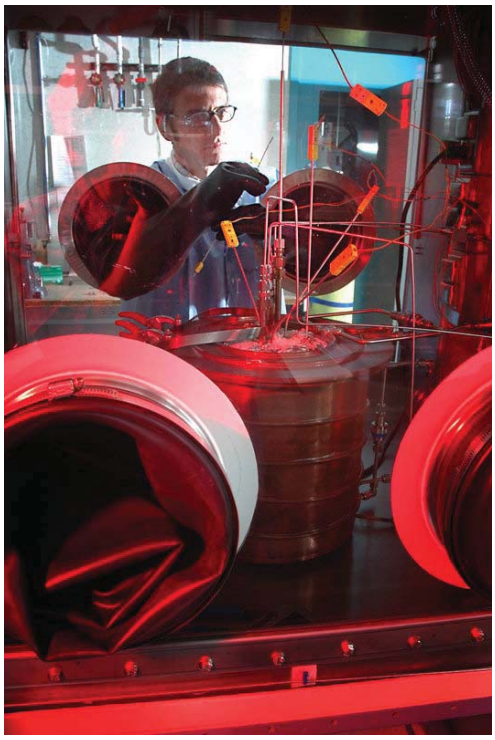

Figure 5. Reactor design, monitoring, operations, and safety are also potential areas for collaboration.

- Fundamentally based Modeling for Severe Accidents
- Self-adapted Modeling.

The group tasked to consider **Uncertainty Quantification** focused on issues of highly nonlinear systems, including data assimilation and experiment design. This group also focused on aging phenomena. They identified a specific need to understand the impact of uncertainty on lifetime prediction for reactors. This area links back to the Reactor Materials issues discussed in Section 3.2.

The **Nuclear Data Generation** group identified an opportunity for collaborating on the generation of nuclear data via differential experiments and nuclear models.

The **I&C** group discussed issues associated with operation of Gen IV reactors and identified several UK resources for statistical software analysis and testing.

The group tasked with identifying areas for collaboration in **Fundamentally based Modeling for Severe Accidents** determined that links can be made between fundamental modeling and education and training using advanced reactor simulators. The group hopes to make these advanced simulators available for student education and training.

The **Self-adapted Modeling** group focused on goal-oriented approaches to modeling that use algorous multiscale closure relations.

3.4 Spent Nuclear Fuel and Waste Management

Spent Nuclear Fuel and Waste Management area attendees split into five subgroups as well:

- Waste System Performance Assessment Modeling
- Understanding Processes in Waste Forms
- Irradiated Materials Performance
- Sample Harvesting
- Advanced Partitioning and Separations.

Each of these groups assessed opportunities, needs, and next steps.

The **Waste System Performance Assessment Modeling** group discussed several potential opportunities by asking the following questions as they relate to the integration of coupled processes that exhibit complex behavior at a wide range of scales:

- How can multiscale models be applied to engineered and natural barrier systems?

- How do we model the interactions between radionuclides, mineralogy, and microbial populations in a thermal-hydro-mechanical framework?
- How can we bound and reduce critical sources of uncertainty in prediction of waste system performance?

The group also identified the need to contact key individuals that can bring expertise from other fields (hydrocarbon, CO_2 sequestration geo-microbiology, rock structure, chemistry, etc.) to this area. Group members felt the next step in this process would be to hold a 1–2 day workshop to build collaborative U.S./U.K. research teams to address the proposed research questions above.

The **Understanding Processes in Waste Forms** group discussed eight potential areas of opportunity:

1. Structural and thermodynamic characterization and kinetics
2. Model relevant experimental conditions
3. Bridging scales of model
4. Interfacial phenomena
5. Separating thermal and radiation effects
6. Identification of specific waste forms
7. Taking advantage of advances in computing
8. Multiple characterization techniques.

The group agreed that the identification of specific systems to study, the exchange of samples and people, and logistics were the biggest areas of need. The group also agreed that the best next step forward is to hold a special session on this topic at the MRS 2010 Spring Meeting.

Figure 6. Participants worked together to identify potential areas for collaboration.

Members of the **Irradiated Materials Performance** group identified two collaborative opportunities regarding complimentary expertise at the University of Michigan: (1) coordination of future programs, and (2) comparisons of lessons learned on fuels, oxides, metals, nitrides, oxides, structural materials, metals, and graphite. The group felt that defining both a matrix of expertise and a mechanism for the exchange of personnel were their largest needs. The next step forward would be to build linked research programs and collaborate with the Understanding Processes in Waste Forms group.

The **Sample Harvesting** group agreed that their best opportunities for collaboration included these three items: (1) gaining reciprocal access to inventions of well-characterized samples, (2) exploiting pooled characterization tools, and (3) generating new data to link to predictive capabilities. The group decided that several needs exist, including the need to organize a meeting and linking activity with National Nuclear Laboratory (U.K.), INL (U.S.), Argonne National Laboratory (U.S.), and Oak Ridge National Laboratory (U.S.) to define the path forward, because this effort requires buy in from all national regulators and industries. In addition, they feel that the next step will be to coordinate harvesting with the Understanding Processes in Waste Forms group and come up with an action plan that addresses the following:

- Construct matrix of interests, participants, and links

- Develop strategy and research priorities
- Present coordinated objectives and routes to success
- Utilize synergies to optimize program
- Seek seed funding for workshop and exchange visits
- Leverage progress – feasibility
- Establish a coordinated and responsive research program.

Finally, the **Advanced Partitioning and Separations** group identified four areas as their greatest opportunities for collaboration: (1) simplifying processing schemes, (2) improving radiation stability of materials, (3) providing Gen IV support, and (4) dealing with spent fuel/orphan waste disposition. Needs include:

- Understanding of the underpinning and the chemistry of existing schemes
- Development of new, simplified schemes
- Development of new schemes to improve Rad Stability
- Mechanics.

The group also identified the following as next steps:

- Discussions between National Laboratory and academic partners in both US/UK
- NNL/NDA discussions in U.K.
- Mechanism and action plan detail.

3.5 Decommissioning and Decontamination

The **Decommissioning and Decontamination** (D&D) area attendees broke into two subgroups: (1) Measurement for D&D, and (2) Knowledge & Technology Transfer. As with the other areas and groups, these subgroups were tasked with identifying capabilities, areas of need, and steps towards collaboration.

Figure 7. Working groups created important opportunities for networking and discussion.

The **Decommissioning and Decontamination** group members agreed that their best opportunities include working better, faster, cheaper, and safer, and providing better analyses, especially on nonpenetration, than in the past. Needs are to focus on utilizing measurement, signal processing, and deployment. Next steps are to further develop ideas and identify a specific target application as soon as possible.

The **Knowledge & Technology Transfer** group members felt that their best opportunities would be improving D&D techniques, waste characterization, and volume reduction, as well as to better

understand problems and provide fresh insight. The group also decided to hold follow-on workshops.

4. Recommendations and Path Forward

It was generally felt that this workshop, and others like it, served as a worthwhile means to generating collaboration between the technical communities of the U.K. and the U.S. Several interactions following the workshop have resulted stronger international teams that can better address challenges in the nuclear field. Examples of these are:

A. UK and US organizations have entered into strategic agreements.

- INL and the University of Oxford have signed a memorandum of understanding to cooperate in analyzing the radiation performance of reactor materials in support of the Reactor Materials Performance topical area

B. Informal or formal collaboration between UK-US organizations have developed.

- The University of Birmingham, the University of Warwick, and INL have prepared a joint proposal to address advanced separations technology for the D&D topical area.
- The University of Birmingham and INL are working together on advanced materials to support a joint proposal to address the Reactor Materials Performance topical area.
- Cambridge University and Pacific Northwest National Laboratory have collaborated on comparing radiation effects in Zircon and Xenotime supporting the Spent Nuclear Fuel and Waste Management topical area.
- Imperial College; Manchester, Lancaster, and Reading Universities; the NNL; and INL have begun work on a research project (EPSRC MBAse consortium, start date April 1, 2010) that will include secondments of postdocs and students to US facilities in support of the Spent Nuclear Fuel and Waste Management topical area.
- Manchester and INL have conducted seminars and student exchanges initially in support of the Spent Nuclear Fuel and Waste Management topical area, with potential extension to all other areas.
- The University of Illinois at Urbana-Champaign and the University of Salford have begun discussing a collaboration to study various properties of graphite in support of the Reactor Materials Performance topical area.
- Imperial College and Los Alamos National Laboratory have been engaged in an informal collaboration in support of the Fuel Technology and Spent Nuclear Fuel and Waste Management topical areas. This has resulted in a successful grant application, joint participation in professional society meetings, and publications.
- Imperial College and the University of California at Berkeley are engaged in collaborative discussions in support of the Reactor Materials Performance topical area and have recently been successful on a proposal.
- University of Florida and Manchester University are collaborating in modeling of nuclear fuels in support of the Fuel Technology topical area

- The University of Florida, Imperial College, and Oak Ridge National Laboratory are working together on a joint Department of Energy proposal for modeling of nuclear fuels in support of the Fuel Technology topical area.

C. US National Laboratories hosted UK interns for developmental training and experience.

- INL hosted a UK NDA employee in civil structural engineering in the Decommissioning and Decontamination topical area

- The University of Bristol together with their spin-out company VEQTER Ltd are providing a residual stress workshop as part of the EPRI-MRP conference in July 2010 at Colorado Springs in support of the reactor design, operations, monitoring and safety topical area.

D. Recommendations from the workshop are:

- That the UK and the US develop more formal support mechanisms for research interactions between the UK Research Councils and the US Department of Energy. The output of this workshop forms a good starting point.

- That the UK and the US explore an exchange mechanism based around the alignment of specific existing UK/US research funding with a small amount dedicated to supporting and enabling research exchanges.

Appendix A

Workshop Materials

UK/US NUCLEAR ENGINEERING WORKSHOP
American Geophysical Union (AGU)
Washington DC
April 20- 21, 2009

Meeting Objective: Focus on opportunities in areas where UK/US collaborations make sense and fill the needs for one or both countries.

Meeting Outcome: Develop a list of UK/US collaborations in specific areas of research, including the next steps and points-of-contact for each country.

AGENDA

Monday, April 20, 2009

8:00	Refreshment	
8:30	Welcome/Opening Remarks	Steve Elsby, UK Dave Hill, US
9:00	Introductions	All
10:20	Networking (15 minute break included)	All
11:20	Brainstorm, Discuss, and Gain Consensus on 5-7 Categories/Areas of Nuclear Engineering Research	All
12:00	*Networking Lunch*	All
13:00	Gallery Walk to Identify Research Gaps / Needs	All
14:00	Gallery Walk Review and Clarification by Category	Facilitators
14:45	*Break*	
15:15	Collaboration Identification (to fill the previously identified gaps or needs)	All
16:00	Form Collaboration Groups by Category of Interest and begin research discussions	All
17:00	*Adjourn*	

UK/US NUCLEAR ENGINEERING WORKSHOP
American Geophysical Union (AGU)
Washington DC
April 20- 21, 2009

AGENDA

Tuesday, April 21, 2009

8:00	Refreshment	
8:30	Welcome / Review / Process for Day Two	Steve Elsby & Facilitators
8:45	Continue Research Discussions to Identify Key Collaborations	Collaboration Groups
10:00	*Break*	
10:30	Prioritize Collaborations and Fill in Action Plan Templates	Collaboration Groups
12:00	*Networking Lunch*	
13:00	UK Market Opportunities Presentation	Paul Howarth
14:00	Prepare Presentation of Key Collaborations (by Main Areas)	Collaboration Groups
15:00	*Break*	
15:15	Present Key Collaborations to Entire Group	Collaboration Groups
16:30	Path Forward (Actions and Success Strategy)	Steve Elsby
17:00	*Adjourn*	

Nuclear Engineering Categories

1. **Fuel Technology**
   a. Increase thermal conductivity (MOX & UO_2)
   b. Improve cladding materials and performance (LOCA issues)
   c. Fuel Performance Code
   d. Development of alternative materials to improve efficiency and burnup
   e. Advanced Fuel Cycles
   f. Advanced and Alternative Fuels (materials & designs)
   g. Fuel fabrication

2. **Reactor Materials Performance**
   a. Analysis and Safety
   b. Gen IV (including VHTR)
   c. Life extension, lifetime prediction
   d. Advanced LWR systems
   e. Construction Engineering
   f. Materials &Technologies, such as pressure vessels, cooling systems, etc.
   g. Corrosion and Erosion

3. **Reactor Design, Operations, and Monitoring**
   a. Controls
   b. Safety, safeguards, security
   c. Radiation Detection and Measurement
   d. Water Chemistry, including the scum

4. **SNF & Waste Management and/or Post Operation**
   a. Reprocessing
   b. Waste forms
   c. Permanent Storage
   d. Disposal
   e. Transmutation of waste (Reduction of volumes and waste recycling)
   f. Environmental Waste Management & Legacy Waste
   g. Advanced Fuel Cycles
   h. Materials Harvesting-International Collaboration
      i. Extension of Lifetime of existing plants
      ii. Initial specs of new reactors (~60 years)
      iii. Material exposure – many years of service
      iv. Documentation
      v. Need to identify best characterized plants
      vi. Share & characterize rescued samples

5. **Decontamination & Decommissioning**
   a. Legacy waste management
   b. Reduction of volumes & waste recycling

6. **Safety (radiological/environmental) & Security & Safeguards**
   a. Proliferation Resistance
   b. Monitoring
   c. International activities
   d. Public and government confidence
   e. Risk analysis
   f. Advanced Safety Systems

Cross Cutting Activities

- Life Extension & Licensing
- Instrument and Controls
- Economic Issues including Comparative Energy Study (other energy sources)
- Materials Development & Testing
- Modeling & Simulation (Cross-cutting)
  - Tied with Experiments & Testing
  - Multiphysics and Multiscale Modeling
- Public understanding of risk
  - Closing the fuel cycle
  - General energy sources
- Skills, Training and Education
- Mechanistic Understanding
  - Uncertainty Propagation
  - Experimental data
- Regulatory Frameworks and Support of Safety Case Development

Key Drivers: Imperatives (support the categories)

- Extend the life and ensure health of fleet
- Stabilize the current fuel inventory
- Bring GEN-III+ plants online
- Bring Advanced reactors online
  - Small advanced LWR
  - HTR
  - Burner Reactors
- Close the fuel cycle

Gallery Walk by Category

1.0 Fuel Technology

US Gaps/ Needs	UK Gaps/Needs	Interested in Collaboration
1. Link atomistic details to phenomena at larger scales. 2. Fission product transport (SiC, ZrC, etc.). 3. Radiation damage of ceramics (Sic, IMF etc.). 4. PIE. 5. Samples for thermochemical studies of fuels, novelty, etc. 6. Fundamental understanding of fuel processing parameters effect on final fuel characterization. 7. Modeling & Simulation of heat transfer. 8. Multiphysics modeling. 9. Thoria fuel cycle. 10. Database for validation of fuel models and codes. 11. Advanced fuel performance models and codes (MOX, UO2, UC, UN, U-Mo) 12. Probabilistic fuel performance models. 13. Crud modeling and prediction related to fuel performance. 14. Development of novel nuclear fuel for advanced burners and LEU fuel for research reactors. 15. Fuel/Clad interactions.	1. Radiation induced degradation/damage of fuel forms. 2. Facility for test fuel fabrication (MOX, HTR Fuel). 3. Access to test fuel irradiations. 4. PIE Facilities. 5. Mechanistic understanding of high burnup (HBU) fuels. 6. Deep burn/disposition of Pu. 7. Modeling and measuring thermal conductivity for IMFs. 8. Powder mixing. 9. Helium behavior. 10. Experimental verification of fission product behavior in fuel (e.g., joint experiment/modeling work with same aims. 11. Thermodynamic modeling of phased development in fuels. 12. Advanced fuel manufacture & testing. 13. Fuel cladding performance in reactive environments. 14. In pile fuel performance. 15. Rod bundle test facility. 16. Carbide/nitride/oxide ceramic fuel assessment. 17. High burnup studies for Gen III. 18. HTR Fuel Test manufacture facility 19. Common fuel performance codes. 20. Manufacture and in-core assessment through experiments and M&S of dirty fuel. 21. Research on migration in HTR Fuel. 22. Understanding Zr oxidation in real conditions.	Ram Devanathan Jim Tulenko Todd Allen Sudarshan Loyalka Simon Pinblott Randy Nanstad Bill Martin Ian Farnan Francis Livens John Ireland Alex Navrotsky Brian Wirth Ian Hutchinson Jack Brenizer Totju Totev Igor Bodnar Andy Klein Ping Xiao Roger Smith Simon Biggs Robin Grimes Neil Hyatt Brent Heuser Richard Rankin Jason Hayward Chris Grovenor Paul Turinsky (contact for K.L. Murty/Jacob Eapen)

2.0 Reactor Materials Performance

US Gaps/ Needs	UK Gaps/Needs	Interested in Collaboration
1. Radiation damage – thermodynamic studies, samples. 2. Develop better interatomic potentials for alloys. 3. High temperature components and structure. 4. LWR crack initiation and growth. 5. Kinetic models of microstructural evolution. 6. Corrosion (CO2, sodium, molten salt) 7. Predictive, physically-based models of component/materials lifetimes. 8. Irradiation testing. 9. Radiation-resistant structural materials. 10. UQ prediction of macro properties from multiphysics / multiscale modeling. 11. Characterization of the atomic-scale structure and composition of nanometer scale Y-Ti-O features in advanced oxide dispersion strengthened steels.	1. Understanding of interfacial properties/performance of materials. 2. Good models of multi-component systems – steels – FeCr alloys etc., from classical atomistic viewpoint (potentials) to structural scales. 3. Better understanding of stress corrosion cracking. 4. Material properties after long-term aging. 5. Complementary high temperature materials test facilities. 6. Access to facilities to irradiate and test samples in reactor environments including PWR & AGR. a. Ferritic, austenitic, nickel-based, zirconium, graphite, polymers b. ODS steels, SiC-SiC, martensitic. 7. Self explaining long-time scale algorithms for long-time matured property prediction (bridging time scales). 8. How do we fabricate / weld ODS steels? 9. Better understanding of combined efforts of stress & temperature & irradiation & fatigue & corrosion (i.e. “real world” conditions. 10. Experimental studies of radiation damage processes to test fundamental mechanisms. 11. Large scale seismic facilities. 12. Understanding material processing history & load history on SCC & high temperature performance. 13. Local crystal plasticity effects on performance. 14. Remote NDE. 15. Effects of helium on materials properties.	Simon Pimblott Steve Donnelly Randy Nanstad Ian Hutchinson Ram Devanathan David Smith Tunc Aldemir John Bouchard Bill Martin Alex Navrotsky Andrew Sherry Audeen Fentiman Brian Wirth George Smith Sudarshan Loyalka John Ireland Robin Grimes Martin Newby Chris Grovenor Paul Turinsky Jack Brenizer Todd Allen Roger Smith Peter Storey Ian Farnan

3.0 Reactor Design, Operations, & Monitoring

US Gaps/ Needs	UK Gaps/Needs	Interested in Collaboration
1. Uncertainty Quantification (UQ) & Verification & Validation (V&V). 2. Financial risk modeling- optimizing the project management of reactor construction. 3. Small LWRs. 4. Thorium Fuel Cycles. 5. Multiphysics modeling with Multiscale. 6. Optimization of nuclear fuel cycle including facility deployment. 7. Design of "optimum" experiments. 8. High Temperature Reactor (HTR) internal experiments testing modeling, & simulation. 9. Models & codes for VHT fuel. 10. Real time monitoring in high temperature, high flux in core environments.	1. Scalable high performance computing (solvers & adaptive methods). 2. Generic, mathematical approaches to Multiscale modeling. 3. UQ for highly nonlinear systems with many input data parameters. 4. Model reduction (POD). 5. UQ treating all sources of uncertainly. 6. Nuclear data needs, including covariances. 7. Model calibrations. 8. Lifecycle economic modeling, decision modeling, performance monitoring, & when to intervene. 9. Computed codes for fuel performance & thermal hydraulics. 10. Coolant/infrastructure chemistry for next generation & advanced reactor systems (test loops and modeling). 11. Common nuclear data sets/libraries. 12. Severe accident research. 13. Nuclear systems engineering capability (balance of plant, NSSS integration). 14. Safety Systems Research (CI Control). 15. Surveillance samples that have been exposed to combined effects of temperature, stress, irradiation, corrosion. 16. Dealing with obsolescence in computer systems and instrumentation.	Ian Farnan (for Geoff Parks, Bill Nutall) Jack Brenizer Tunc Aldemir Martin Newby Ian Hutchinson David Smith Matt Eaton Bill Martin Sherrell Greene Andrew Sherry Audeen Fentiman Andy Klein Paul Turinsky (for Dimetry Anistraton) Jason Hayward Simon Pimblott John Ireland Sudarshan Loyalka George Smith Igor Bodnar Totju Totev John Bouchard

4.0 SNF & Waste Management

US Gaps/ Needs	UK Gaps/Needs	Interested in Collaboration
1. Facilities for hot fuels experts plus synchrotron light technologies. 2. 'Nuclearised' analytical facilities. 3. Numerical modeling of multiphased transport at multiple scales in highly heterogeneous porous materials (including reactive transport issues). 4. Standard dataset and simulation approach to advanced fuel cycle analysis. 5. Fast ion implementation to stimulate radiation damage and coupled ion probe analysis techniques. 6. Hot cell capability to characterize microstructure of spent fuel cladding and test facility for corrosion studies in panel vector. 7. Well characterized/documented 'Harvested" materials to help us understand long-term materials behavior/degradation. 8. In-situ examination of irradiated materials. 9. Interfacial processes (radiation –induced) of oxides / polymers, etc., at temperature and pressure. 10. Improved performance envelope for hydrometallurgical separation (e.g. third phase). 11. Long term strategic approach. 12. Chemistry of new/novel reprocessing systems. 13. Research on defined boundary conditions and endpoint, acceptance criteria between waste packages and repository. 14. Pilot scale/demonstration technology facilities, e.g. cold crucible melters. 15. Cements and grouts. 16. Public understanding of decision making using risk-based science. 17. Encapsulates for reactive metals. 18. Experimental verification of fission product partition in phases-ceramic waste forms. 19. Inert atmosphere capability to mimic repository conditions. 20. Non-aqueous processing technology. 21. Uncertainty elicitation - performance	1. Experimental data and testing for transport model development / conceptualization, e.g., sorption. 2. Test bed facilities for characterization method development. 3. Radiochemistry labs / actinide separations. 4. Include electronic excitation effects in models in a physically meaningful way. 5. Samples for thermodynamic characterization of element incorporation in waste forms, radiation damage, fission products. 6. Harvesting materials from shutdown plants for comparison of material with test reactor of models. 7. Chemical reaction transport expertise for input to reactive transport THC & THMC coupled modeling. 8. Utilization of waste. 9. Waste form expertise for source-term input to transport modeling. 10. Fun and creative person to work on stochastic characterization issues for heterogeneous domains. 11. Library of well documented irradiated materials structures and components from existing / extinct reactors.	Audeen Fentiman Simon Pimblott Ian Farnan Jerry Fairley Francis Livens Becky Lunn Andrew Sherry Tunc Aldemir Randy Nanstad Alex Navrotsky Ram Devanathan, Bill Martin Martin Newby Jack Brenizer Phil Wheatley Sudarshan Loyalka Robin Grimes Neil Smart Colin Boxall John Ireland Jim Tulenko Brian Wirth Andy Klein Stuart Lyon Simon Biggs Neil Hyatt Ken Nash Peter Storey George Smith Todd Allen Richard Shaw Roger Smith Richard Rankin

4.0 SNF & Waste Management

US Gaps/ Needs	UK Gaps/Needs	Interested in Collaboration
monitoring – inspection – intervention. 22. Propagation of risk in safety cases for disposal / long-term storage. 23. Hazard index for spent fuel inventory to establish priorities for disposition. 24. Behavior SF-storage/disposal. 25. Waste product long-term performance. 26. Pu disposition. 27. U Storage and disposal 28. Disposal site characterization. 29. Experimental verification of fission product behavior in vitreous waste forms. 30. Are effects of beta, alpha, gamma, and neutron radiations additive?		

5.0 Decommissioning and Decontamination

US Gaps/ Needs	UK Gaps/Needs	Interested in Collaboration
1. Integration of construction skills and understanding of dealing with radioactive materials. 2. Remote D&D technologies. 3. Sensors / detectors. 4. Robotic D&D Technology. 5. Radiochemical / Rad Waste Processes.	1. Access to hot labs. 2. Engagement of appropriate academic skills base (e.g., civil engineering). 3. Multi-criteria approach / life assessment to decommission options. 4. Radiometric and non-radiometric characterization / NDA techniques for determining radiation levels, hot spots, etc., in facilities. 5. Scabbing concrete surfaces (clever concrete decontamination). 6. Low level analyses to support reclassification / free release. 7. Contaminated land remediation. 8. Defined waste package boundary conditions and defined site end point. 9. Remote operation monitoring devices. 10. Access to test materials / locations. 11. Have remote D&D robotics. 12. Public understanding of risk-based science and regulation.	Audeen Fentiman Neil Smart-NDA Simon Biggs Richard Shaw Francis Livens (for Bernard Kelly) Richard Rankin Colin Boxall Phil Wheatley Sherrell Greene Andy Boston Becky Lunn Nick Stevens Graham Fairhall James Taylor Colin Boxall

6.0 Safety, Security, Safeguards

US Gaps/ Needs	UK Gaps/Needs	Interested in Collaboration
1. Identify high priority needs for nuclear data relevant to nuclear security and safeguards. 2. Low volume; high effective detectors with detection and identification capabilities. 3. Data fusion to combine multiple sensors. 4. Wireless test. 5. Cyber security. 6. Proliferation Metrics. 7. Clear data sets. 8. International, common framework for risk informed decision making. 9. Security probabilistic risk assessment (PRA) technology. 10. Human Risk Analysis. 11. Probabilistic methods of safety Margins. 12. Licensing Confirmatory Analysis Capability for Advanced Reactors. (SFR, GCR, MSR) 13. Licensing Framework for Reprocessing Plants. 14. Monitoring and sensor development for high temperature/corrosive environments (and expertise in same for technology that exists. 15. Public understanding and regulation using risk-based science. 16. Larger volume, room temperature semiconductor sensors.	1. Radiation instrument. • High efficiency • Low cost • Portable • Emergency Capable • Material (e.g. CZT) 2. Security & Supply. 3. Wireless Technology. 4. Cyber Security. 5. Feedback mechanisms for fast reactor. 6. Severe accident phenomenology post closure criticality analysis. 7. Non DBA analysis. 8. Modeling capability (fundamentally based) for severe accidents. 9. Decision support/decision analysis. 10. Corium melt model. 11. Dealing with obsolescence in computer and instrumentation systems. 12. Advanced radiometrics for SNM Detection. 13. Emergency Response Analysis (onsite & offsite) coupled to Probability Safety Analysis. 14. NRTMA instrumentation. 15. Long-term effects of low dose rate radiation. 16. Develop “near miss” reporting culture. Borrow ideas from aerospace sector; learn lessons from events that nearly happened.	Jack Brenizer Audeen Fentiman Andy Boston Jim Tulenko Jason Hayward Jan Hutchinson Sherrell Greene Ian Farnan (for Bill Nuttall) John Ireland Bill Martin David Smith Becky Lunn Colin Boxall (for Malcolm Joyce Lancaster) Matt Eaton (Imperial) Francis Livens (for Simon French) Sudarshan Loyalka Andy Klein Tunc Aldemir Igor Bodner Totju Totev Andrew Sherry Simon Pimblott Jerry Farley Paul Turinsky (for Robin Gardner)

Team Development of Collaboration Opportunities Between the UK and the US

Group 1: Fuel Technology

Category:	**1. Fuel Technology**	
Title:	**Modeling and Simulation of Fuel Fabrication**	
Opportunity:	Use modeling to explore well defined n-dimensional variable space to find critical combinations of variables. Multiscale, multiphysics addressing or predicting: • Particle morphologies – f^n of process variables • Flow and packing mixing characteristics (green body) • Sintering models	
Needs or Next Steps:	Identify the funding stream. Need non-ceramic fuel development. Need help with sintering models.	
Country:	***United Kingdom***	***United States***
Expertise:	• Leeds - U-particle • Imperial - morphology • NNL - chemical engineering, process modeling • Sheffield – ceramic processing, microstructure	• LANL - oxides/nitrides • ORNL - TRISO, actinide targets, ceramics • INL - Dispersion, metal fuel (Rory Kennedy) • Texas A&M • NC State University (Jacob Eapen) - modeling & simulation during irradiation.
Coordinators:	Scott Owens – NNL	Sherrell Green – ORNL

Category:	**1. Fuel Technology**	
Title:	**Fuel Performance – Experimental**	
Opportunity:	ATR	
Needs or Next Steps:	New experiments and database of previous experimental results (Fuel Performance Codes)	
Country:	***United Kingdom***	***United States***
Expertise:		
Coordinators:	Ian Farnam	Todd Allen

Category:	**1. Fuel Technology**	
Title:	**Experimental Verification of Fuel Fabrication Steps**	
Opportunity:	Crossover to many modeling steps. Test – morphology changes at confluence of variables that exhibit critical change: validate. Test – the models – develop process models. Test – predictions of porosity, mechanical properties, etc.	
Needs or Next Steps:		
Country:	***United Kingdom***	***United States***
Expertise:	• NNL • LEEDS – Biggs • Manchester • Imperial – Lee • Sheffield	• INL-Rory Kennedy & Steve Hayes • Illinois • ORNL – Sol Gel, sphere pack, TRISO (LEU, Actinide), Ceramic (actinide targets, U-Pu-NE), VAL dispersion/CERMET • LANL – UO2, MOX
Coordinators:	Tim Abram	Brent Heuser

Category:	**1. Fuel Technology**	
Title:	**Fuel Performance – Modeling & Simulation**	
Opportunity:	Extensive programs underway in Ezah Country. Seeking to enhance contributions by coordination and making people aware of other programs.	
Needs or Next Steps:	Mechanisms to coordinate 1. Develop e-mail list (keep open for new additions) 2. RG/JT to meet on May 20 to continue formation 3. Utilize CMSN/NEA to coordinate with other entities.	
Country:	***United Kingdom***	***United States***
Expertise:	• I.C. – Cambridge • M.C.-Oxford	• INL-LANL-UF • ELNL-PNNL-UCB • ANL-ORNL-MIT
Coordinators:	Robin Grimes (RG)	Jim Tulenko (JT)

Group 2: Reactor Materials Performance

Category:	**2. Reactor Materials Performance**	
Title:	**Irradiation Embrittlement - Covers RPU and structural materials**	
Opportunity:	• Life extension • Provision of US facilities • Expansion of multiscale modeling basic physics	
Needs or Next Steps:	Define scope, needs, and money. Coordinators will define working group.	
Country:	***United Kingdom***	***United States***
Expertise:	Liverpool, Oxford, Loughborough, Imperial, Manchester, Salford.	INL, ORNL, LANL (flux rate effects) Michigan, Berkeley, Davis, LANL, Wisconsin, Santa Barbara. U of Michigan (Gary Was) Fei Gao (PNNL) is working on simulations relevant to lifetime extension (fei.gao@pnl.gov). NC State University – experimental work on Zirconium based fuel cladding and carbon steel reactor pressure vessels (K.L. Murty). Penn State University – Arthur Motta – irradiation damage.
Coordinators:	Steve Donnelly / Randy Grimes	Brian Wirth / Todd Allen

Category:	**2. Reactor Materials Performance**	
Title:	**Library – Material Harvesting (refer to group 4)**	
Opportunity:	Database/ characterization of materials.	
Needs or Next Steps:	Group 4 (waste) and Group 1 (Fuels)	
Country:	***United Kingdom***	***United States***
Expertise:		
Coordinators:	Graham Fairhall – NNL	Allen, Nanstad, Maloy (ANL, ORNL, LANL)

Category:	**2. Reactor Materials Performance**	
Title:	**High Temperature Structural Materials (Metals and Non-Metals)**	
Opportunity:	Overlaps with fusion. Access to facilities, including irradiation Fabrication processes. Life extension. Potential for links with conventional power industry's interest in high temperature materials (David Smith – Bristol).	
Needs or Next Steps:	Define scope, needs, dosh-funding. Coordinators will define the working groups. Scope: need to understand combined effects of stress, temperature, and radiation on structural materials.	
Country:	***United Kingdom***	***United States***
Expertise:	Bristol, Oxford, Open, Imperial,	ORNL, INL, LANL, Boise State, Wis, MIT (fusion), Michigan, Davis, Bartel, Gary Was (U of Michigan). High temperature structural materials (non-metal) e.g. SiC, carbides – Ram Devanathan (PNNL) Ram.devanathan@pnl.gov
Coordinators:	D. Smith (metals), Marsden (non-metals)	Nanstad (metals), Lance Snead (non-metals) (ORNL)

Category:	**2. Reactor Materials Performance**	
Title:	**PWSCC and Irradiation (EAC) - Covers steels, cladding, Zirconium**	
Opportunity:	US facilities for irradiation and post testing analysis impact of cold work, mechanistic understanding, etc.	
Needs or Next Steps:	Define scope, needs, and funding. Coordinators will define the working group. Links – Group 4 waste containment.	
Country:	***United Kingdom***	***United States***
Expertise:	Manchester, Oxford, Open, Bristol	INL, ORNL, PNNL, ANL, LANL, Michigan, Wisconsin, MIT Penn State University – Arthur Motta – stress crack corrosion
Coordinators:	James Marrow (Mandi), Simon Pimblott	Jeremy Busby – ORNL

Group 3. Reactor Design, Operations, Monitoring, and Safety

Category:	**3. Reactor Design, Operations, Monitoring, and Safety**	
Title:	**Uncertainty quantification for highly non-linear systems, including data assimilation and design of experiments. (includes aging phenomena)**	
Opportunity:		
Needs or Next Steps:	Need to understand impact of uncertainty on lifetime prediction (David Smith – Bristol) Link to Group 2.	
Country:	***United Kingdom***	***United States***
Expertise:	Geoff Parks (Cambridge)	
Coordinators:	Martin Newby	Paul Turinsky

Category:	**3. Reactor Design, Operations, Monitoring, and Safety**	
Title:	**Generation of Nuclear Data**	
Opportunity:	Generation of nuclear data via differential and integral experiments, and utilization in nuclear models.	
Needs or Next Steps:		
Country:	***United Kingdom***	***United States***
Expertise:	Manchester nuclear physics – Jon Billowes UK-NNL – looking at national needs for nuclear data in UK – Colin Zimmerman Interested in thorium and accelerator driven systems - Bill Nuttall – Cambridge	
Coordinators:	Matthew Eaton	Paul Turinsky

Category:	**3. Reactor Design, Operations, Monitoring, and Safety**	
Title:	**I&C**	
Opportunity:	Issues associated with instrumentation and control for operating reactors and Gen IV.	
Needs or Next Steps:		
Country:	***United Kingdom***	***United States***
Expertise:	• Requirement for statistical testing of software – John Ray. • Statistical Software Analysis – Pete Sorop (?), Malcohm Lople (Lancaster)	
Coordinators:	John May (Bristol)	Tunc Aldemir

Category:	**3. Reactor Design, Operations, Monitoring, and Safety**	
Title:	**Fundamentally based modeling for severe accidents.**	
Opportunity:		
Needs or Next Steps:	Link this to education and training using advanced reactor simulators. Can these be made available for student education and training?	
Country:	***United Kingdom***	***United States***
Expertise:	Newcastle, UNI, UK – Involved in SARNET & interested in this area.	
Coordinators:	Matthew Eaton	Andy Klein

Category:	**3. Reactor Design, Operations, Monitoring, and Safety**	
Title:	**Self-adaptive, goal-oriented (e.g., risk or funding) modeling approaches using algorous multi-scale closure relations.**	
Opportunity:		
Needs or Next Steps:		
Country:	***United Kingdom***	***United States***
Expertise:		
Coordinators:	Matthew Eaton	Bill Martin

Group 4: SNF & Waste Management

Category:	**4. SNF & Waste Management**	
Title:	**Waste system performance assessment modeling**	
Opportunity:	Integrating coupled processes that exhibit complex behavior at a wide range of scales. • How can Multiscale models be applied to engineered and natural barrier systems? • How do we model the interactions between radionuclides, mineralogy and microbial populations in a thermal-hydro-mechanical framework? • How can we bound and reduce critical sources of uncertainty in prediction of waste system performance?	
Needs or Next Steps:	• Contact key individuals that can bring expertise from other fields (hydrocarbon, CO2 sequestration geo-microbiology, rock structure, chemistry, etc.) • Hold a 1-2 day workshop to build collaborative US/UK research teams to address proposed research questions.	
Country:	***United Kingdom***	***United States***
Expertise:	Don't forget that BGS has work programming in CCS, hydrocarbon, and resources areas that are relevant. RP Smith (?) Kath Morris – Leeds Richard Pattrick – Manchester Nick Bryan, Jon Lloyd – Manchester Andy Binley – Ground water flow around repository (Lancaster)	PNNL has expertise in CO2 sequestration, geomicrobiology, and reactive transport needed. – EMSL facility at PNNL Is there a need or potential for understanding He structural integrity and life of waste containment systems? David Smith (Bristol)
Coordinators:	Rebecca Lunn	Jerry Fairley

Category:	**4. SNF & Waste Management**
Title:	**Understanding Processes in Waste Forms in Waste Forms - Group 4**
Opportunity:	Structural and thermodynamic characterization and kinetics. Model relevant experimental conditions. Bridging scales of model Interfacial phenomena Separating thermal and radiation effects Identify specific waste forms. Take advantage of advances in computing Multiple characterization techniques.

Needs or Next Steps:	Identify specific systems to study Exchange samples and people Special session at MRS 2010 spring Logistics Support for making, characterizing, sharing (shipping) samples.	
Country:	***United Kingdom***	***United States***
Expertise:	Understanding processes in waste forms interfacial phenomena. Water uptake on metal oxide surfaces – Colin Boxall - Lancaster Nick Bryan, Manchester, Francis Livens, Simon Pimblott,	Lumin Wang, Univ of Michigan
Coordinators:	Ian Farnan (Cambridge)	Ram Devanathan (PNNL)

Category:	**4. SNF & Waste Management**	
Title:	**Performance of Irradiated materials**	
Opportunity:	Complimentary expertise at UofM/INL • Coordination of future programs • Comparisons of lessons learned Fuels, oxides, metals, nitrides, oxides, structural materials, metals, graphite	
Needs or Next Steps:	Define matrix of expertise Define mechanism for exchange of personnel Build linked research programs. Note: Cross over with waste forms for irradiation studies	
Country:	***United Kingdom***	***United States***
Expertise:	Qualification of radiation damage; number of atoms displaced – Ian Farnan – Cambridge Performance of irradiated materials; water uptake on plukowii (?) surfaces – Colin Boxall Radiation effects in carbides; oxides – Ram Devanathan (PNNL) Interested in modeling atomic level radiation effects and defect evolution.	Lumin Wang – U of Michigan
Coordinators:	Simon Pimblott (+MPC)	Philip Wheatley

Category:	**4. SNF & Waste Management**	
Title:	**Sample harvesting for lifetime extension and performance of materials in storage**	
Opportunity:	Reciprocal access to inventions of well characterized samples. Exploit pooled characterization tools. Generate new data to link to predictive capabilities.	
Needs or Next Steps:	NNL/INL/ANL/ORNL to meet and link activities. Develop plan to define the way forward. This needs buy in from national regulators and industries. Coordinate harvesting with group 2. Action Plan: • Construct matrix of interests, participants, and links. • Develop strategy and research priorities. • Present coordinated objectives and routes to success. • Utilize synergies to optimize program. • Seek seed funding for workshop and exchange visits • Leverage progress – feasibility. • Coordinated and responsive research program.	
Country:	***United Kingdom***	***United States***
Expertise:		
Coordinators:	Graham Fairhall	Phil Wheatley

Category:	**4. SNF & Waste Management**
Title:	**Advanced Partitioning and Separations**
Opportunity:	Simplification of processing schemes Improving Rad stability of materials Gen IV support Spent fuel/orphan waste disposition
Needs or Next Steps:	Understand underpinning – Chemistry of existing schemes Development of new schemes (simplified) Development of new schemes (improved Rad Stability) Mechanics Discussions between NL and academic partners in both US/UK NL/NDA discussions in UK Mechanism and Action Plan Detail: • Richard Taylor, Colin Boxall to meet with Robin Taylor • Richard Taylor, Colin Boxall to meet with Francis Livens and Simon Pimblott.

	• Ken Nash to meet with Gregg Lumetta (PNNL) • Ken Nash to meet with Scott Herbst (INL) • Notes to be compared • Discussions with NDA as key NNL customer • KN to meet with Terry Todd Output Target: Outline research plan addressing all stakeholder needs. Means: Exploitation of existing resolve to facilitate plan development meeting. Multiple established dialogs; informal collaborations between ORNL & UK. Should survey other labs as well. Sherrell Greene	
Country:	***United Kingdom***	***United States***
Expertise:	Physical-chemistry modeling, Actinide chemistry, separation science Sven Schroeder (Manchester Chem. Engineering). Contact via F. Livens – Process Development	Actinide chemistry; separations science US Universities: UNLV, Oregon State
Coordinators:	Colin Boxall – Lancaster	Ken Nash, WSU

Group 5: Decommissioning and Decontamination (D&D)

Category:	**5. Decommissioning and Decontamination (D&D)**	
Title:	**Measurement for D&D**	
Opportunity:	Better, faster, cheaper, safer, analysis, especially non-penetrating.	
Needs or Next Steps:	Utilize measurement, signal processing, and deployment. Further development of ideas. ASAP identify specific target application.	
Country:	***United Kingdom***	***United States***
Expertise:	Bristol - Potential research on civil engineering deconstruction of structures – David Smith NNL - Sellafield Requirements. Liverpool – Instruments - A.	Boston, P. Nolan
Coordinators:	Malcolm Joyce	Richard Rankin

Category:	**5. Decommissioning and Decontamination (D&D)**	
Title:	**Knowledge and Technology Transfer**	
Opportunity:	Improvement in D&D techniques, waste characterization, and volume reduction. Understanding of problems and fresh insight.	
Needs or Next Steps:	Follow-on Workshop(s)	
Country:	***United Kingdom***	***United States***
Expertise:		
Coordinators:	Bernard Kelly	Richard Rankin

ATTENDANCE: UNITED KINGDOM

First Name	Last Name	Phone	E-Mail	Institution
Simon	Biggs	44 0 113 343 2790	s.r.biggs@leeds.ac.uk	University of Leeds
Andrew	Boston	44 0 151 794 6776	ajb@ns.ph.liv.ac.uk	University of Liverpool
John	Bouchard	44 0 1908 332950	p.j.bouchard@open.ac.uk	Open University
Colin	Boxall	44 0 1534 593109	c.boxall@lancaster.ac.uk	University of Lancaster
Stephen	Donnelly	44 0 161295 5392	s.e.donnelly@salford.ac.uk	University of Salford
Matthew	Eaton	44 0 207 594 9320	m.eaton@imperial.ac.uk	Imperial College London
Stephen	Elsby	44 01793 444458	stephen.elsby@epsrc.ac.uk	Engineering and Physical Sciences Research Council
Graham	Fairhall	44 0 19467 79275	graham.a.fairhall@nnl.co.uk	National Nuclear Laboratory
Ian	Farnan	44 0 1223 33431	if203@cam.ac.uk	University of Cambridge
Brian	Ferrar	202-588-6686	brian.ferrar@fco.gov.uk	S& I Network
Melinda	Goforth	202-588-6864	melinda.goforth@fco.gov.uk	UK Trade & Investment
Robin	Grimes	44 0 207 594 6730	r.gromes@ic.ac.uk	Imperial College London
Chris	Grovenor	44 0 1865 273737	head.department@materials.ox.ac.uk	University of Oxford
Paul	Howarth	44 0 7712 937382	paul.ja.howart@nnl.co.uk	National Nuclear Laboratory
Neil	Hyatt	44 0 114 222 5470	n.c.hyatt@sheffield.ac.uk	University of Sheffield
Brad	Keelor	202-588-6677	bradley.keelor@fconet.fco.gov.uk	S&I Network

UK/US NUCLEAR ENGINEERING WORKSHOP
American Geophysical Union (AGU)
Washington DC
April 20- 21, 2009

First Name	Last Name	Phone	E-Mail	Institution
Ruth	Lee	202-588-7690	ruth.lee@rcuk.ac.uk	Research Councils UK
Francis	Livens	44 0 161 2754647	francis.livens@manchester.ac.uk	University of Manchester
Rebecca	Lunn	0141 548 2826	rebecca.lunn@strath.ac.uk	University of Strathclyde
Martin	Newby	44 0 20 7040 8347	m.j.newby@city.ac.uk	City University
Simon	Pimblott	44 0 161 275 1325	simon.pimblott@mancheste.ac.uk	University of Manchester
Richard	Shaw	44 0 115 936 3545	rps@bgs.ac.uk	British Geological Survey
Andrew	Sherry	44 0 115 936 3545	andrew.sherry@mancheste.ac.uk	University of Manchester
Neil	Smart	44 0 1925 802192	neil.smart@nda.gov.uk	Nuclear Decommissioning Agency
Roger	Smith	44 0 1509 223192	r.smith@loboro.ac.uk	Loughborough University
David	Smith	44 1179 288212	david.smith@bristol.ac.uk	University of Bristol
George	Smith	44 1865 273762	george.smith@materials.ox.ac.uk	University of Oxford
Peter	Storey	44 0 151 951 4172	peter.storey@hse.gso.gov.uk	Health and Safety Executive
Richard	Taylor	44 0 1925 834171	richard.x.taylor.nnl.co,uk	National Nuclear Laboratory
Naomi	Webber	202-588-7693	naomi.webber@rcuk.ac.uk	Research Councils UK

UNITED STATES

First Name	Last Name	Phone	E-Mail	Institution
Tunc	Aldemir	614-356-1688	aldemir.1@osu.edu	Ohio State University
Todd	Allen	608-265-4083	allen@engr.wisc.edu	University of Wisconsin
Igor	Bodnar	630-252-8336	bodnar@anl.gov	Argonne National Laboratory
Lori	Braase	208-526-7763	lori.braase@inl.gov	Idaho National Laboratory
Jack	Brenizer	814-863-6336	brenizer@engr.psu.edu	Penn State University
Collette	Brown	202-586-0876	colette.brown@nuclear.energy.gov	DOE- Office of Nuclear Energy
Ram	Devanathan	509-371-6487	ram.devanathan@pnl.gov	Pacific Northwest National Laboratory
Jerry	Fairley	202-885-9259	jfairley@uidaho.edu	University of Idaho
Audeen	Fentiman	765-494-5340	fentiman@purdue.edu	Purdue University
Sherrell	Greene	865-574-0626	greenesr@ornl.gov	Oak Ridge National Laboratory
Jason	Hayward	865-574-5699	haywardjp@ornl.gov	University of Tennessee
Brent	Heuser	217-333-9610	bheuser@illinois.edu	University of Illinois
David	Hill	208-526-0707	david.hill@inl.gov	Idaho National Laboratory
Ian	Hutchinson	617-253-8760	ihutch@mit.edu	MIT
John	Ireland	505-667-8777	john.ireland@lanl.gov	Los Alamos National Lab
Paul	Kearns	614-256-3057	'kearnsp@battelle.org'	Battelle

UK/US NUCLEAR ENGINEERING WORKSHOP
American Geophysical Union (AGU)
Washington DC
April 20- 21, 2009

First Name	Last Name	Phone	E-Mail	Institution
Andrew	Klein	208-526-3289	kleina@engr.orst.edu andrew.klein@inl.gov	Oregon State University
Sudarshan	Loyalka	573-882-3568	loyalkas@missorui.edu	University of Missouri
William	Martin	734-764-5534	wrm@umich.edu	University of Michigan
Lester	Morss	301-903-9311	lester.morss@science.doe.gov	DOE-Office of Science
Randy	Nanstad	865-574-4471	nanstadrk@ornl.gov	Oak Ridge National Laboratory
Ken	Nash	509-335-2654	knash@wsu.edu	Washington State University
Alex	Navrotsky	530-752-3292	anavrotsky@ucdavis.edu	University of California Davis
Bryan	Parker	208-526-2560	bryan.parker@inl.gov	Idaho National Laboratory
Richard	Rankin	208-526-3049	richard.rankin@inl.gov	Idaho National Laboratory
Totju	Totev	630-252-4506	totev@anl.gov	Argonne National Laboratory
Jim	Tulenko	352-392-2562	tulenko@ufl.edu	University of Florida
Paul	Turinsky	919-515-5098	turinsky@ncsu.edu	North Carolina State
Philip	Wheatley	208-526-9348	philip.wheatley@inl.gov	Idaho National Laboratory
Brian	Wirth	510-642-5341	bdwirth@nuc.berkeley.edu	University of California Berkeley

Appendix B

Attendee Survey Results

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Paul Howarth
ORGANISATION/INSTITUTION: UK NNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A special nuclear material management (spent nuclear fuel) B Fuel technology
I NEED HELP with the following research gap(s) or need(s): A PU fuel manufacture and burn – up assessment for disposition B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Access to PU samples B PU dedicated facilities for mox fuel manufacture

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Alex Navrotsky

ORGANISATION/INSTITUTION: UC Davis

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Thermodynamics, calorimetry solid state chemistry

B Geo chemistry, minenalogy

I NEED HELP with the following research gap(s) or need(s):

A Well defined samples for thermochimicro studies atomic scale modelling applicable to new fuels and fuel cycles, waste rad damage

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Heats of formation vitrification, sco/nec energies water adsorption energies.

B Correlation to molecules – level stmaturl textures. I have unique high terlerimetric capabilities applications of interest new fuels, e.g nitrides UO2 with RE depants, also THO2 and CO2 as a PaO2 analogue ceramic and glass waste forms reaiations damage unanium V and VI solids

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Colin Boxall

ORGANISATION/INSTITUTION: Lancaster University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Decommissioning robotics. Nuclear instrumentation.

B Tomography of porous metals. Measurement and modelling of ground water flow

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Remote NDE via tomography

B

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Alex Navrotskey
ORGANISATION/INSTITUTION: UC Davis
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Thermodynamics calcinatory solid state chemistry B
I NEED HELP with the following research gap(s) or need(s): A Well characterised materials B Alumistic modelling
I CAN (most likely) HELP with the following research gap(s) or need(s): A Thermodynamic studies of radiation damage and annision , imperotoes on fuels (also all card in area (1)) B

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: George Smith
ORGANISATION/INSTITUTION: Oxford University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: AAtomic scale materials Characterisation (Atomprobe) B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Study of surveillance sample materials – measure B Evolution of microstructure, phase chemistry, properties

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Ayman Hawaii (Paul Turnsky POC)
ORGANISATION/INSTITUTION: NC State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear Data B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Generation of neutron scattering kernels B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Neil Smart
ORGANISATION/INSTITUTION: NDA
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Geoloqud Disposal B Waste management
I NEED HELP with the following research gap(s) or need(s): A Waste form behaviour (SF or Pu or cemetic waste products) long term. B Aspects of radio include transport in environment
I CAN (most likely) HELP with the following research gap(s) or need(s): A Exp data and testing for transport model development B Chemical reaction transport for reactive transport THC modelling

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Randy Nanstad Sherrell Greene PITBI
ORGANISATION/INSTITUTION: Nuclear Materials Science and Technology Group Oak Ridge National Laboratory
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Materials Science B Fuel Development/processing
I NEED HELP with the following research gap(s) or need(s): A Obtain material samples from shutdown reactors to examine for comparisons with test reactor irradiated and with models B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Materials examination, and modelling B irradiation and testing of materials. Radiochemical processing / separations. Instrumentation for NDA (Hayward)

POSSIBLE COLLABORATION … **GROUP 5 BLUE**

NAME:
Colin Boxall

ORGANISATION/INSTITUTION:
Lancaster University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Decommissioning robotics
B Nuclear instrumentation
C Tomography of porous materials
D Measurement and modelling of ground water flow
E Remote sensors and novel analytical methods

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A A, B, E, C above

B

POSSIBLE COLLABORATION …	GROUP 5 YELLOW

NAME:

Belle Upadhyaya (bupadhya@utk.edu)
Wes Hines (jhines2@utk.edu)

ORGANISATION/INSTITUTION:

University of Tennessee

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Monitoring, Reliability, Prognostics

B

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Nonradiometic sensors

B

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Paul Howarth

ORGANISATION/INSTITUTION: UK NNL

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Safe guards / proliferation

B Materials Accountancy

I NEED HELP with the following research gap(s) or need(s):

A Near real time materials accountancy

B proliferation definition (boundary condition)

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Facilitated for PU research. Safe guards techniques

B Materials control. Tracking techniques

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: PI: PITBI
POC: Sandersham Loyalka

ORGANISATION/INSTITUTION: University of NLO – Columbia

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Nuclear safeguards

B Nuclear security

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A 6c: International activities

B 6d: Public & Govt confidence

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Simon Biggs
ORGANISATION/INSTITUTION: Leeds University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A particle manufacture B Powders handling / mixing for fuel manufacture
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Todd Allen
ORGANISATION/INSTITUTION: Wisconsin / INL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radation damage and transport in fuel B
I NEED HELP with the following research gap(s) or need(s): A Post – irradiation exams B Fuel fabrication
I CAN (most likely) HELP with the following research gap(s) or need(s): A Reactor testing B Hot labs/materials archive

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: John Bouchard (POC)

ORGANISATION/INSTITUTION: Open University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Residual stress and the integrity of welded structures

B High temperature materials performance

I NEED HELP with the following research gap(s) or need(s):

A Local crystal plasticity effects on performance.

B Access to facilities to irradiate and test samples in reactor environments (welded). How to fabricate ODS Materials (welding)

I CAN (most likely) HELP with the following research gap(s) or need(s):

A LWR carch invitation and growth (residual stress related issues)

B predictive physically based models of component lifelines. High temperature components and structures

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Sudarsham K. Loyalka (also coroning for colleagues at Mission Uni)
ORGANISATION/INSTITUTION: University of Mission
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A VHTR's B Multi physics / multi scale simulations
I NEED HELP with the following research gap(s) or need(s): A Reactor material performance: Aualysist safety B Reactor materials performance GEN IV (including VHTR'S)
I CAN (most likely) HELP with the following research gap(s) or need(s): A Same as above; these are topics where we could help B

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: Martin Newby PITBI

ORGANISATION/INSTITUTION: City University, London

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Stochastic modelling. Lifecycle models including aging, monitoring and inspection based on evolution of performance characteristics - PRA

B Elicitation of probabilities, uncertainty propagation; stochastic processes; propagation of uncertainty

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Uncertainty quantification and validation and verification

B Experimental design/data analysis for monitoring data

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: T Toter
ORGANISATION/INSTITUTION: ANL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear fuel performance B probabilistic models
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Coupled codes for FP and thermal – hyoboulog B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Becky Lunn

ORGANISATION/INSTITUTION: University of Strathclyde

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Hydro – mechanical modelling of porous saturated materials (soils/rocks/backfill)

B Crack – sealing using microbes

I NEED HELP with the following research gap(s) or need(s):

A Fast efficient multi – scale modelling

B Multiphase reactive transport models

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Data collection/site characterisation

B Fracture sealing using microbes

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Larry Miller (ifmiller@utk.edu)

ORGANISATION/INSTITUTION: University of Tennessee

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Safety, security, safeguards

B SNF and Waste management

I NEED HELP with the following research gap(s) or need(s):

A
B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Uncertainty evaluation related to fuel cycles

B

POSSIBLE COLLABORATION …	**GROUP 5 BLUE**

NAME:
Colin Boxall

ORGANISATION/INSTITUTION:
Lancaster University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

(TRAINING)

A MSc in Decommissioning
MSc in Safety Engineering
BEng/MEng in Nuclear Engineering

B

I NEED HELP with the following research gap(s) or need(s):

A Student exchanges

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Integration of construction/engineering skills and dealing with radioactive materials

B

POSSIBLE COLLABORATION …	**GROUP 5 YELLOW**

NAME:

Shenell Greene (poc) PITBI

ORGANISATION/INSTITUTION:

ORNL

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A D : D

B

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Radiochem Cleamp Process Dev

B Robotic Systems

C Sensors

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Colin Boxall

ORGANISATION/INSTITUTION: Lancaster University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Decommissioning Robotics. Nuclear Instrumentation

B Tomography of porous materials. Measurement & modelling of groundwater flow

I NEED HELP with the following research gap(s) or need(s):

A

B)

I CAN (most likely) HELP with the following research gap(s) or need(s):

A High efficiency low lod radiation detectors & identification capabilities (Nuclear instrumentation)

B

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: PI: Audeen Fentiman and Colleagues
ORGANISATION/INSTITUTION: Purdue University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Monitoring B Public & Government confidence
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Monitoring technology development B Public understanding & acceptance of nuclear technology

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Simon Pimblott
ORGANISATION/INSTITUTION: University of Manchester
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation – induced damage B Simulation and modelling
I NEED HELP with the following research gap(s) or need(s): A Radiation induced degradation of fuel forms B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Radiation damage of ceramics B Multi scale modelling – atomistic to real scale

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Sherrell green (POC) PITBI
ORGANISATION/INSTITUTION: ORNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear materials and fuels B Radiochemical & reprocessing process development & SIT
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Hot radiochem process development B matls & fuels synthesis & fabrication Irradiation & PIE. HPC & simulation

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Grovenor and Smith

ORGANISATION/INSTITUTION: Oxford University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Nanoscale characterisation. Structment chemistry with unique range of analytical facilities advanced THE/3D atom probe / nano sims

B Micro scale mechanical testine methologies for surface layers individual grain boundaries including in corrosive environments (Steve Roberts)

I NEED HELP with the following research gap(s) or need(s):

A Really interesting materials to study (1) well characterised irradiated samples. (2) Novel / new materials

B Access to heavy ion irradiation facilites

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Atomic scale characterisation with our suite of instruments and the expertise to use them

B

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Brent Heuger
ORGANISATION/INSTITUTION: University of Illinois @Urban Champangu
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Micro analytical analysis of materials B Hydrogen in metals
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Thin film UO2 and actinide samples B Analysis of materials using scattering and other techniques

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: Matthew Eaton
ORGANISATION/INSTITUTION: Imperial College
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Uncertainty Modelling B Multi scale and multi physics
I NEED HELP with the following research gap(s) or need(s): A Nuclear data BUA for non linear system
I CAN (most likely) HELP with the following research gap(s) or need(s): A Optimisation of fuel cycle (Jon Carter) B Multi physics and uncerty modelling (Pain and Eaton)

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Audeen Fentiman (for colleagues)
ORGANISATION/INSTITUTION: Purdue University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation detection B Safety and Safeguards. Thermal hydraulics
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Modelling and simulation tied to experiments and testing – particularly thermal hydraulics for BWRs B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Richard Shaw (POC)

ORGANISATION/INSTITUTION: British Geological Survey

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Geosciences aspects of deep geological disposal of radioactive waste

B Multi – phase fluid flow in 'geological' media inc low permeability materials

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Site characterisation. Proofing access to URL's in Europe

B Experimental data on transport properties through low permeability media (e.g. Bentonites, mudstones)and permeable geological materials

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: James Tulenko
ORGANISATION/INSTITUTION: University of Florida
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A SNF and waste disposal B Thoris behennin repository
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Carry out fuel leaching experiment. Fully licensed for Nuclear Fuel B Carrying out non aqueous reprocessing

POSSIBLE COLLABORATION …	**GROUP 5 BLUE**

NAME:

Colin Boxall

ORGANISATION/INSTITUTION:
Lancaster University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Microwave scabbling

B

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A See above

B

POSSIBLE COLLABORATION …	GROUP 5 YELLOW

NAME:

Jerry Fairley

ORGANISATION/INSTITUTION:

University of Idaho

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Multiphase flow & Heat transport

B Site characterisation (including CFO statistical analysis) for heterogeneous sites

I NEED HELP with the following research gap(s) or need(s):

A Access to data & sites for testing numerical and conceptual models

B Access to data & sites for developing & testing site characterisation methods for complex/heterogeneous sites

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Site characterisations, conceptual model development, sample analysis/planning

B Simulation for uncertainty analysis

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: PI: Andy Klein (for Oregon State)
ORGANISATION/INSTITUTION: Oregon State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation detector development POC:Abi Farsoni and David Hamby B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A B B & coincidence detection development

POSSIBLE COLLABORATION …	**GROUP 6** **BLUE**

NAME: Martin Newby
ORGANISATION/INSTITUTION: City University (provider Centre for software Reliability)
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Software reliability/safety cases B
I NEED HELP with the following research gap(s) or need(s): A B)
I CAN (most likely) HELP with the following research gap(s) or need(s): A protection systems/safety cases B

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Simon Pimblott (POC) Stuart Lyon and Michael Preuse
ORGANISATION/INSTITUTION: University of Manchester
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Zirconium Oxidation B Corrosion
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Zr oxidation B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: James Tulenko (POC)
ORGANISATION/INSTITUTION: University of Florida
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Fuel processing, fabrication, fuel management, fuel performance and fuel disposal – multiscale analysis fuel cycle economics B
I NEED HELP with the following research gap(s) or need(s): A Multi scale fuel modelling kinetic Monte Carlo and finite element work to compare with our molecular dynamic work B
I CAN (most likely) HELP with the following research gap(s) or need(s): A We have fully luersed fuel processing facilities – provide experimental data B Expertise in molecular dynamics and extensive computing facility

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Martin Newby

ORGANISATION/INSTITUTION: City University, London

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Stochastic modelling: typically life cycle models including aging, monitoring and inspection maintenance based on evolution of performance characteristics

B Elicitation of probabilities and uncertainty propagation stochastic process – eg crack growth

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Statistical modelling of crack growth based on physical models and environmental / usage factors. Experimental and field data

B Lifetime data analysis. Both classical and based on evolution of iritic charactimsies threshold crossing

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Bill Martin
ORGANISATION/INSTITUTION: University of Michigan
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Materials effects of radiation (emulate with ion beam deposition) Gary was B AAV LWR systems – John Lee
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Stress couosioncracking B Exp studies of radiation damage process to test fundamental mechanisms

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: Paul Howarth

ORGANISATION/INSTITUTION: NNL

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Reactor design

B

I NEED HELP with the following research gap(s) or need(s):

A Safety systems assessment (thermal hydrarios, digital C&I control, passive safe systems) for GEN3 reactions

B Experimental test facilities

I CAN (most likely) HELP with the following research gap(s) or need(s):

A UK assessment technique and data libraries

B From modelling and simulation

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: T Toter
ORGANISATION/INSTITUTION: ANL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear fuel performance B probabilistic models
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Sealable tight performance computing B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Richard Taylor

ORGANISATION/INSTITUTION: NNL UK

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Spent fuel disposition

B Fuel Royde

I NEED HELP with the following research gap(s) or need(s):

A Attentive flow sheets for the recycle / conditioning of small quantity / lingh fissile orphan fuels

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Active facilities for experiments with snef

B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Sandy Birk
ORGANISATION/INSTITUTION: Idaho National Laboratory
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A SNF behaviour during storage and disposal B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Dry cask storage behaviour – SNF degradation during storage – hydride formation treatment B Repository degradation and critical safety

POSSIBLE COLLABORATION …	**GROUP 5 BLUE**

NAME:

Steve Donnelly POC

ORGANISATION/INSTITUTION:
University of Salford

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A

B

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Unused/under-used facilities available for hot expts (UK gap need)

B

POSSIBLE COLLABORATION …	GROUP 5 YELLOW

NAME:

Derek Wadsworth

ORGANISATION/INSTITUTION:

Idaho National Laboratory

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Robotics

B Remote ops/inspection

I NEED HELP with the following research gap(s) or need(s):

A Test/demo sites

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Remote operation monitoring devices

B UAV remote D&D robotics

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: (Ian Hutchinson) PI Jacky Yanch
ORGANISATION/INSTITUTION: MIT
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation transport and interactions B Low level effects of rediation
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Long term effects of low dose radiation B

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Ian Farnan POC Bill Nuttall PI
ORGANISATION/INSTITUTION: University of Cambridge Engineering (Nuttall)
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Technology policy, Nuclear energy policy and security future systems B Accelerator driven systems through fuel cycle fusion/fission hybrids
I NEED HELP with the following research gap(s) or need(s): A B)
I CAN (most likely) HELP with the following research gap(s) or need(s): A Economic analysis of future nuclear energy systems B

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Simon Pimblott (POC) Ping Xiao (PI)

ORGANISATION/INSTITUTION: University of Manchester

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Triso particles

B High temp oxidation

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A New and novel fuels and their performance

B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Sherrell Greene (POC) PITBI
ORGANISATION/INSTITUTION: ORNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Fuel technology B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Multi scale / multi physics simulation B Fuel fab irradiation PIE - tried actinide targets – oxide – moltem salt

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Robin Grimes

ORGANISATION/INSTITUTION: Imperial College, London

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Fundamental radiation damage processes

B Cladding performance models

I NEED HELP with the following research gap(s) or need(s):

A Exp studies of radiation resistant materials (processes of materials that give rise to)

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Atomic scale processes from which basic physics processes can be derived

B Modelling of ODS steels. Radiation resistant structural materials

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: (Ian Hutchinson) PI Ron Ballinger
ORGANISATION/INSTITUTION: MIT Nucl sci Materials SCI MIT Reactor
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Materials for nuclear reactor application B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Have in-core high-tempor (to 1600C) test facility demonstrated B Corrosion. Degradation cracking triso fuel integrity analysis

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: Paul Howarth
ORGANISATION/INSTITUTION: NNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Reactor physics (Design, operations and monitoring) B
I NEED HELP with the following research gap(s) or need(s): A Coupled codes for fuel performance and thermal hydraulic assessment of GEN3 systems B Experimental facilities (Test loops pod bundle facilities)
I CAN (most likely) HELP with the following research gap(s) or need(s): A Access to UK codes & data analysis from modelling simulation B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Andy Klein (for Oregon)
ORGANISATION/INSTITUTION: Oregon State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Uncertainty quantification and numerical model additions POC: Todd Palmer B Reaction scaling and thermal/hydraulic testing POC: Brian Woods and Qiao Wu
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A High performance computer code department B System / test facility scaling, integral system testing, separate effects T/H facility and tests

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Richard Taylor

ORGANISATION/INSTITUTION: NNL UK

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A SNM Disposition

B

I NEED HELP with the following research gap(s) or need(s):

A Pressurisation mechanisms for PU Powder stored in sealed containment

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A PU active facilities for experiments

B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Phil Wheatley

ORGANISATION/INSTITUTION: Idaho National Laboratory

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Irradiated materials handling examination, measurement and analysis

B

I NEED HELP with the following research gap(s) or need(s):

A
B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Shielded hot cells at various scales capable of handy small to large size fuel, cladding or irradiated materials coupled with analytical facilities

B

POSSIBLE COLLABORATION …	**GROUP 5 BLUE**

NAME:

Andy Boston (POC)

ORGANISATION/INSTITUTION:
University of Liverpool

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Radiation instrumentation

B MC modeling

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Sensors/detectors

B

POSSIBLE COLLABORATION …	GROUP 5 YELLOW

NAME:

Rick Demmer/Don Maiers

ORGANISATION/INSTITUTION:

Idaho National Laboratory

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Decontamination and Decommissioning

B

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Scabbling concrete surfaces/cleve D&D

B

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Matthew Eaton
ORGANISATION/INSTITUTION: Imperial College
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Crud modelling and clad ballooning B Multi physics modelling
I NEED HELP with the following research gap(s) or need(s): A Severe accident phenomenon B)
I CAN (most likely) HELP with the following research gap(s) or need(s): A B

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: jack Brenizen, Kenan Unta, PI's
ORGANISATION/INSTITUTION: Penn State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation detection and measurement egp –n & 8 B detects development. Nuclear NDT Methods
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Radiation instruments B Advanced radiometrics for SNR detection

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Simon Pimblott (POC) Tim Abram (PI)
ORGANISATION/INSTITUTION: University of Manchester
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A nuclear fuel systems and technology B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Ceramic fuels B Fuel Performance

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Jason Eapen (Paul TurinskyPOC)
ORGANISATION/INSTITUTION: NC State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A materials simulation B
I NEED HELP with the following research gap(s) or need(s): A Coupling of scales in multi scale simulations of fuels B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Large scale simulations for materials science B

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: David Smith

ORGANISATION/INSTITUTION: University of Bristol – Mechanical Engineering

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A High temperature deformation and fracture of steels

B

I NEED HELP with the following research gap(s) or need(s):

A Complementary high temperature material test facilities

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Understanding the effects of prior history on deformation and fracture – high temperature components and structures

B

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Arthur Motta PI
ORGANISATION/INSTITUTION: Penn State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Materials damage/esp cladding B Stress corrosion cracking
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A See above B

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: Simon Pimblott

ORGANISATION/INSTITUTION: University of Manchester

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Radiation effects

B Modelling & simulation

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Coolant & infrastructure for next gen & adv reactors

B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: PI: PITBI POC: Sandershan K. Loyalka (also for colleagues)
ORGANISATION/INSTITUTION: University of Nicisown – Columbia
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear safety B Water chemistry
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Water Chemistry, including the saim B Nuclear safety (source term)

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Richard Taylor

ORGANISATION/INSTITUTION: NNL UK

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Spent fuel and SNM Disposition

B

I NEED HELP with the following research gap(s) or need(s):

A Socio economic assessment of the implications of disposition decisions for SNM and fuel

B What criteria to use to justify the selection of a disposition option at a National level

I CAN (most likely) HELP with the following research gap(s) or need(s):

A

B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Brent Hellsy

ORGANISATION/INSTITUTION: University of Illinois @ Urbana - Champaign

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Micro analytical analysis of materials

B Hydrogen in metals

I NEED HELP with the following research gap(s) or need(s):

A
B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Thin film UO2 and activide samples

B Analysis of materials using scattering and other techniques

POSSIBLE COLLABORATION …	GROUP 5 BLUE

NAME:
Graham Fairhall

ORGANISATION/INSTITUTION:
UK NNL

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Decommissioning toolbox techniques development

B Remote deployment in nuclear environment

I NEED HELP with the following research gap(s) or need(s):

A Non radiometric sensors

B Flexible deployment of dismantling/measurement techniques in cell

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Remote engineering R&D

B Hot cells / testing facilities

POSSIBLE COLLABORATION …	GROUP 5 YELLOW

NAME:

Mike Carpenter

ORGANISATION/INSTITUTION:

Idaho National Laboratory

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Fieldable assay / rod analysis

B

I NEED HELP with the following research gap(s) or need(s):

A Test/ demo sites

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Low level analysis

B

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Simon Pimblott (POC) Simon French (PI)
ORGANISATION/INSTITUTION: University of Manchester
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A decision support – decision analysis B Informatics
I NEED HELP with the following research gap(s) or need(s): A B)
I CAN (most likely) HELP with the following research gap(s) or need(s): A Decision support – decision analysis B Informatics

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: Ken Nash (Contact) Sue Clark PI
ORGANISATION/INSTITUTION: Washington State University (Chemistry)
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radio analytical Chemistry B Activide Chemistry / Environmental conditions
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Analytical methods for sensor development B Radiation instrumentation. Radiological lab facilities

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Paul Howarth
ORGANISATION/INSTITUTION: UK NNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Fuel technology B
I NEED HELP with the following research gap(s) or need(s): A High burn – up of mox/UO2 fuel for GEN 3 systems B Mtr fuel fabrication
I CAN (most likely) HELP with the following research gap(s) or need(s): A Facilities for MTR fuel manufacture B PIE Facilities. Code analysis from fuel performance analysis

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Ivan Maldonado (ivan.maldonado@utk.edu) Art Ruggles (aruggles@utk.edu)
ORGANISATION/INSTITUTION: University of Tennessee Oak Ridge National Lab
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A In core fuel management calculations (Maldonado) B Multi – physics modelling and design of experiments related to thermal – hydraulics (Ruggles)

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: David Smith

ORGANISATION/INSTITUTION: University of Bristol – Mechanical Engineering

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Role of residual stress on structural integrity in reactor environments

B

I NEED HELP with the following research gap(s) or need(s):

A Access to facilities to irradiate and test welded samples

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Measurement of residual stress in large scale components – radiation resistant structural materials

B

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: K L Musty (Paul Turnsky POC)
ORGANISATION/INSTITUTION: NC State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Materials science experimentation of structural (steels) materials and cladding B (Zirconium)
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Development of nano materials used for structures (pressure vessel of LWRs) B

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: Andrew Sherry (Dominique Laurence Hector)
ORGANISATION/INSTITUTION: University of Manchester
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Thermal Hydraulics coupled solid mechanics B Muld phase flow
I NEED HELP with the following research gap(s) or need(s): A calibration B validation
I CAN (most likely) HELP with the following research gap(s) or need(s): A Multi physics modelling B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Divitsty Anlstsatov (Paul Turnsky POC)
ORGANISATION/INSTITUTION: NC State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Transport theory B mathematical physics
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Lower – higher order solutions of transport equation e.g. quasi – diffusion theory B Multiphysics coupling

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Richard Taylor

ORGANISATION/INSTITUTION: NNL UK

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Spent fuel Disposition

B Fuel Recycle

I NEED HELP with the following research gap(s) or need(s):

A Disposal behaviour of commercial spent fuel in repository environments

B CFA's and licensing issues for disposal of SNF. What are the main areas of technical under pinning required

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Active facilities for undertaking disposal / storage experiments and SNF

B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Mike Carpenter
ORGANISATION/INSTITUTION: Idaho National laboratory
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Field deployable radiation measurement systems B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A In - situ exam of irradiated mat'ls B

POSSIBLE COLLABORATION …	GROUP 5 BLUE

NAME:

Francis Livens

ORGANISATION/INSTITUTION:

Manchester

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Mechanisms of contam/decontam
B Development of functional materials
C Optioneering (B Kelly)
D Robotics/remote characterisation and dismanteling

I NEED HELP with the following research gap(s) or need(s):

A Access to test samples and test locations

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Decontam technologies (strippables, electrochem)

B Optioneering

POSSIBLE COLLABORATION …	GROUP 5 YELLOW

NAME:

Audeen Fentiman & colleague

ORGANISATION/INSTITUTION:
Purdue University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Waste reduction and management

B Civil engineering and construction engineering management

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Construction engineering management for D&D

B

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Andy Boston (POC)
ORGANISATION/INSTITUTION: University of Liverpool
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation instrumentation B MC Modelling
I NEED HELP with the following research gap(s) or need(s): A Detection supply B)
I CAN (most likely) HELP with the following research gap(s) or need(s): A 1) detector capabilities B 14) lager volume detection

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: John Ireland - POC
ORGANISATION/INSTITUTION: LOS Alamo
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Safety / severity / safeguards – safeguards by design B Licensing of reprocessing facilities proliferation resistant fuel cycles
I NEED HELP with the following research gap(s) or need(s): A Licensing of reprocessing facilities B Proliferation metrics
I CAN (most likely) HELP with the following research gap(s) or need(s): A Facility Security B Nuclear material Safeguards

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Robin Grimes

ORGANISATION/INSTITUTION: Imperial College London

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Atomic scale simulations of fission product behaviour in conventional and advanced fuels

B Development of underpinning physics models that describe the behaviour of fission products in fuel

I NEED HELP with the following research gap(s) or need(s):

A Experimental verification of fission product behaviour

B fuel performance code developers who wish to use new physics based models

I CAN (most likely) HELP with the following research gap(s) or need(s):

A provide physics based models for fuel performance codes

B Provide values for fission product behaviour e.g. activation energies for migration as resolution

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: T Tottie
ORGANISATION/INSTITUTION: ANC
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear fuel cerocevous B probaleolostic liodals
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Fuel cladding performance B Understanding of troxidation

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Colin Taylor (Contact David Smith)
ORGANISATION/INSTITUTION: University of Bristol – Civil Engineering
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Non – linear dynamics, earthquake engineering B
I NEED HELP with the following research gap(s) or need(s): A Access to large scale seismic facilities B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Predictive, physically – based models of component life times B

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Ayman Hanari (Paul Turnsky POC)
ORGANISATION/INSTITUTION: NC State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A user diagnostic facilities on research reactors in support of materials science B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Access to ultra cold neution source phase imaging neution radiography, position source, and position sensitive power diffractometer B

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: Andrew Sherry (Tim Abraham)

ORGANISATION/INSTITUTION: University of Manchester

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Reactor design

B Fuel

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Optimisation of Nuclear fuel cycle inc. facility deployment.

B Design of optimum experiments. Models/codes for VHT fuels

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Bill Martin
ORGANISATION/INSTITUTION: University of Michigan
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Reactive design/analysis/simulation (Tom Downae, John Lee, Bill Martin) B Transport (Ed Larsen, James Holloway, Bill Martin)
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Severe accident research B Safety systems research

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Peter Storey

ORGANISATION/INSTITUTION: ND, HSE

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Nuclear safety and security regulator (UK)

B

I NEED HELP with the following research gap(s) or need(s):

A The UK needs to scope the extent of issue (outlined below) and then engage with us National Labs. As a minimum both the UK and US share catalogues of samples available. Ideally there may be scope to facilitate simple transfer and optimise samples held

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A In service sample archiving current position of such samples needs assessing. Industry) licenses and NDA) need to be engaged and requirements justified; My offer of help is to do this. Then I propose that NNL (Graham Fairhall) is engaged as PSI. the UK needs a strategic approach to sample harvesting that is sustainable

B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Ron Klingler 1-208-526-0183
ORGANISATION/INSTITUTION: Idaho National laboratory
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Establish system requirements, define technology readiness levels, develop structured research program to achieve end goals B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Long term strategic approach B Public understanding / science based approach

POSSIBLE COLLABORATION …	GROUP 5 BLUE

NAME:

Becky Lunn

ORGANISATION/INSTITUTION:

University of Strathclyde

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Crack sealing using microbial technology

B

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A

B

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: David Blockley (contact David Smith)
ORGANISATION/INSTITUTION: University of Bristol Civil Engineering
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Systems engineering, management of risk B
I NEED HELP with the following research gap(s) or need(s): A Emergency response analysis B)
I CAN (most likely) HELP with the following research gap(s) or need(s): A International common framework for risk informed decision making B

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: Robin Gardner (Paul Turnisky POC)
ORGANISATION/INSTITUTION: NC State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Monte Carlo modelling of radiation detection problems for purpose of solving inverse problem B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Detection of strategic materials for safeguards B

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Neil Hyatt
ORGANISATION/INSTITUTION: University of Sheffield
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A processing and fabrication methods to produce aromic oxide fuel analogues B
I NEED HELP with the following research gap(s) or need(s): A thermal conductivity of inert matrix fuels – experimental measurements and modelling B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Well characterised and understood samples for thermodynamic studies B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: T Tottie
ORGANISATION/INSTITUTION: ANC
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear fuel behaviour B probaleolostic liodals
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A UC, UN, Uox, UO2, U- UO fuel performance assissment B

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Simon Pimblott
ORGANISATION/INSTITUTION: University of Manchester
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation effects B Modelling and simulation
I NEED HELP with the following research gap(s) or need(s): A Interfacial properties / performance of materials B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Radiation effect B

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Todd Allen
ORGANISATION/INSTITUTION: Wisconsin / INL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Corrosion / stress corrosion cracking B Radiation damage of fuels and materials
I NEED HELP with the following research gap(s) or need(s): A Post – irradiation testing B materials Fabrication
I CAN (most likely) HELP with the following research gap(s) or need(s): A Irradiation testing (ATR and ION beams) and examination (hot labs) B Corrosion (CO_2, water sodium, molten salt)

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: David Smith
ORGANISATION/INSTITUTION: University of Bristol
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Structural integrity B
I NEED HELP with the following research gap(s) or need(s): A Uncertainty quantification for highly non-linear systems B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Understanding effects of prior loading an structural integrity B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Hany Abdel – khalik (Paul Turinsky POC)
ORGANISATION/INSTITUTION: NC State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A V & V, UQ and data assimilation B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A UQ & data assimilation for line sizable problems B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Simon Pimblott
ORGANISATION/INSTITUTION: University of Manchester
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation Effects B Modelling and simulation
I NEED HELP with the following research gap(s) or need(s): A New reprocessing systems. Waste form performance B heterogeneous porous materials
I CAN (most likely) HELP with the following research gap(s) or need(s): A Effects of B/8 vs & Vs in irradiation B Encapsulants for reactive metals

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: John Ireland – Gordon Jarrinen (PoC)
ORGANISATION/INSTITUTION: Los Alamos
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A SNF and waste management B
I NEED HELP with the following research gap(s) or need(s): A Technitive waste forms B
I CAN (most likely) HELP with the following research gap(s) or need(s): A B

POSSIBLE COLLABORATION …	**GROUP 5 BLUE**

NAME:

Andy Boston

ORGANISATION/INSTITUTION:

University of Liverpool

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Laser Scabbling

B 2D/5D optics / image overlaying

I NEED HELP with the following research gap(s) or need(s):

A Available test site

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Scabbling (concrete) UK

B

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Simon Pimblott

ORGANISATION/INSTITUTION: University of Manchester

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Radiation Effects

B Modelling & Simulation

I NEED HELP with the following research gap(s) or need(s):

A Low dose rate effects inferred from high dose rate studies (Risk modelling)

B)

I CAN (most likely) HELP with the following research gap(s) or need(s):

A
B

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: Bill Martin
ORGANISATION/INSTITUTION: University of Michigan
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Risk analysis – static/dynamic (John Lee) B Advanced safty simulation methods (Tom Downar)
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Model US capability for server accidents B Ajv radiometrics for SNM detection

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Andrew Sherry (Joe Robson)
ORGANISATION/INSTITUTION: University of Manchester
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Micro structural modelling B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Kinetic models of micro structural evolution B

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Steve Donnelly POC
ORGANISATION/INSTITUTION: University of Salford
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation damage processes in situ TEM oberservation of radiation damage processes B Inert gases in solids
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A He behaviour (UK gap/need) B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: T Tottie
ORGANISATION/INSTITUTION: ANC
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear fuel behaviour B probaleolostic liodals
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Fuel performance codes B

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Brian Wirth
ORGANISATION/INSTITUTION: UC Berkeley, Department of Nuclear Engineering
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A irradiation effects in nuclear materials – computational models and experimental characterisation B Nuclear fuel performance
I NEED HELP with the following research gap(s) or need(s): A Providing a library of irradiation structural materials for characterisation of embrittlement/ microstructure B Computational physicists interested in developing computational methods for long time evolution
I CAN (most likely) HELP with the following research gap(s) or need(s): A Position annihilation spectroscopy characterisation of irradiated materials B Kinetic models of defect/solute transport in irradiated materials

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: Andrew Sherry (Tim Abraham)
ORGANISATION/INSTITUTION: University of Manchester
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Reactor design B Fuel
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A TH Fuel cycle B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Paul Turinsky

ORGANISATION/INSTITUTION: NC State University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A V & V, UQ

B Multiphysics modelling of Nuclear systems

I NEED HELP with the following research gap(s) or need(s):

A UQ for highly nonlinear systems where stochastic sampling is computationally prohibitive generic approach to multi scale modelling for phase space decomposition approaches

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A UQ and data assimilation for problems with both large data fields and large number of observables

B Multiphysics modelling

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Simon Pimblott

ORGANISATION/INSTITUTION: University of Manchester

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Radiation Effects

B Modelling and simulation

I NEED HELP with the following research gap(s) or need(s):

A Interfacial (radn-induce) processes of oxides and polymers @ temp & pressure

B In situ (i.e. under Radn, temp & pres) examination of materials

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Electronic excitation in models

B Non – aqueous processing technology. Ion beam irradiation

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Jay Roach

ORGANISATION/INSTITUTION: Idaho National Laboratory

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Pilot scale / demonstration

B

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Existing pilot scale cold crucible induction melter with state of the art off gas treatment and research facility

B Steam reformer fluidized bed pilot scale facility

POSSIBLE COLLABORATION …	**GROUP 5 BLUE**

NAME:

Richard Shaw (POC)

ORGANISATION/INSTITUTION:

British Geological Survey

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Public understanding in radwaste context (Julie West – PI)

B Remote sensing techniques (PITBI)

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Development of public understanding educational techniques

B Characterisation of contaminated land (non-invasive)

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Colin Boxall

ORGANISATION/INSTITUTION: Lancaster University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Decommissioning robotics. Nuclear instrumentation. Tomography of porous materials

B Measurement and modelling of groundwater flow. Elected chemical sensors

I NEED HELP with the following research gap(s) or need(s):

A
B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Sensor development for high T/corrosive environments
B

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: Jason Hayward haywardjp@ornl.gov
ORGANISATION/INSTITUTION: Oak Ridge national Lab University of Tennessee
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Safety, security and safeguards B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Data fusion (video/visible light + radiometrics (&,NS) + inertial) B

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Ian Farnan POC Bill Nuttall / Geoff Parks PI's
ORGANISATION/INSTITUTION: University of Cambridge Engineering
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A In coke optimisation B ADS and Thorium fuel cycle
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Economic and technological assessments of ADS and thorium fuel cycle B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: T Tottie
ORGANISATION/INSTITUTION: ANC
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear fuel behaviour B probaleolostic liodals
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Experimental verification of fission product behaviour B

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Andrew Sherry

ORGANISATION/INSTITUTION: University of Manchester

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Materials performance (corrosion / SCC testing structural integrity, meso – scale modelling)

B Materials characterisation (ATEM, FIB, scm tomography – x ray and synitrotion, residual stress)

I NEED HELP with the following research gap(s) or need(s):

A Testing of irradiated materials – mechanical and fracture toughness

B Testing of irradiated materials SCC

I CAN (most likely) HELP with the following research gap(s) or need(s):

A LWR crack initiation and growth (imaging antoclare facility)

B predictive physically – based models of component / materials lifetime

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Ram Devanathan

ORGANISATION/INSTITUTION: PNNL

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Modelling fission reactor materials for lifetime extension

B POCs (fei gao Chuck Henager) PNNL

I NEED HELP with the following research gap(s) or need(s):

A Long time scale simulation

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Modelling reactor structural materials

B

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: John May

ORGANISATION/INSTITUTION: University of Bristol Civil Engineering

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Safety systems research, statistical testing

B

I NEED HELP with the following research gap(s) or need(s):

A Dealing with obsolescence in computer systems and instrumentation

B Uncertainty quantification

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Design of optimum experiments

B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Sevnggin Kim Fan Bill Cheung PI
ORGANISATION/INSTITUTION: Penn State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Severe accident modelling and eapmiments B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Running T/H experiments in nod bundle facility B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Colin Boxall

ORGANISATION/INSTITUTION: Lancaster University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Novel analytical methods and sensors. Novel membrane materials for separations and dialysis / electro osmosis

B Urex and novel reprocessing routes. Chemical / hydro dynamic kinetic modelling

I NEED HELP with the following research gap(s) or need(s):

A Hot labs for Urex / novel reprocessing data

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A

B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Sanderson Layalka
ORGANISATION/INSTITUTION: University of NM Columbia
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Direct energy conversion sensors/detectors B
I NEED HELP with the following research gap(s) or need(s): A 4h? utilization of nuclear waste B
I CAN (most likely) HELP with the following research gap(s) or need(s): A 4d disposal B

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Roser Smith (PI John Andrews : J.D.Andrews@lboro.ac.uk)
ORGANISATION/INSTITUTION: Loughborough University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Risk and Reliability Modelling - quantitative B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Quantitative risk assessment B

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: Wes Hines (jhinesz@utk.edu) Jason Hayward (jhayward@utk.edu)
ORGANISATION/INSTITUTION: University of Tennessee
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Online monitoring and safeguards B Data validation and Processing
I NEED HELP with the following research gap(s) or need(s): A Indentifying facility needs B Identifying key measurement points
I CAN (most likely) HELP with the following research gap(s) or need(s): A Near real time material accountancy B Risk analysis. Sensor/system modeling

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Ian Farnan POC PI
ORGANISATION/INSTITUTION: University of Cambridge Earth Sciences
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Local structure in nuclear fuels – inert matrix, UO2/UO2 + X TRISO Fuels B He incorporation in UO2 fission product incorporation UO2 e.g. CS
I NEED HELP with the following research gap(s) or need(s): A Sample production, characterisation and shipping B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Element special spectroscopy: - nuclear magnetic resourance masnmr on radiological samples B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: T Tottie
ORGANISATION/INSTITUTION: ANC
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuclear fuel behaviour B probaleolostic liodals
I NEED HELP with the following research gap(s) or need(s): A PIE B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Hog curuup studies B

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Steve Donelly POC

ORGANISATION/INSTITUTION: University of Salford

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Radiation damage processes – in-situ TEM obersavation of radiation damage processes

B Smart gases in solids

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Experimental studies of radiation damage processes to test.

B Fundamental mechanisms. Effects of HE on materials properties (UK gap/Need)

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: John Ireland – Stewart Maloy (POC)
ORGANISATION/INSTITUTION: Los Alamos
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Reactor materials performance B
I NEED HELP with the following research gap(s) or need(s): A Data B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Hot coals PIE B

POSSIBLE COLLABORATION …	GROUP 3 BLUE

NAME: Paul Smith

ORGANISATION/INSTITUTION: Loughborough University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Computational – modelling – molecular dynamics, ab-initio – linked md- finite elements

B Continuum modelling: heat transfer (etc) ceramics/metals/covalent systems

I NEED HELP with the following research gap(s) or need(s):

A Developing multi component potentials for nuclear materials

B Efficient saddle – point finding algorithms for long time dynamics

I CAN (most likely) HELP with the following research gap(s) or need(s):

A linking finite elements to molecular dynamics

B Modelling radiation events

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: (Point of contact Ian Hutchinson) PI Jacopo Buongiosho
ORGANISATION/INSTITUTION: MIT
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Thermal Hydraulics. Critical heat flux experiments. Reactor engineering B Nanofluid characterization and nuclear energy applications
I NEED HELP with the following research gap(s) or need(s): A Multifluid computational fluid dynamics and modelling B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Reactor thermal engineering and physics B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Francis Livens

ORGANISATION/INSTITUTION: University of Manchester

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Radioelement chemistry and geochemistry

B Waste form performance (with Sheffield). Separation chemistry

I NEED HELP with the following research gap(s) or need(s):

A Transport expts, especially inert atmosphere and transoranics

B Prep and characterisation of highly active materials

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Coupled thermodynamic / kinetic speciation modelling

B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Bill Martin
ORGANISATION/INSTITUTION: University of Michigan
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Waste forms – Lumin Wang – Rod Ewing B Adv fuel cycles – John Lee (modelling)
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Adv fuel cycle analysis B Pu disposition / encapsulation

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Andy Boston (PETBE)

ORGANISATION/INSTITUTION: University of Liverpool

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Laser scrabbling

B 2D/3D optics image overlay

I NEED HELP with the following research gap(s) or need(s):

A
B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Remote technologies
B Data fusion to combine multiple sensors (2)

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: Sherrell Greene POC
ORGANISATION/INSTITUTION: ORNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Safety B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A LWR,GcR,SFR modelling & sim B Wireless cyber security

POSSIBLE COLLABORATION …	GROUP 1 BLUE

NAME: Grovenor and Smith

ORGANISATION/INSTITUTION: Oxford University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A nanoscale characterization, structure and chemistry with unique range of analytical facilities

B

I NEED HELP with the following research gap(s) or need(s):

A Really interesting materials to study

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Atomic scale characterization

B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Brent Heuger
ORGANISATION/INSTITUTION: University of Illinois @ Urbana – Champargu
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Micro analytical analysis of materials B hydrogen in metals
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Thin film UO2 actinide samples B Analysis of materials using scattering of other techniques

POSSIBLE COLLABORATION …	GROUP 2 BLUE

NAME: Roser Smith

ORGANISATION/INSTITUTION: Loughborough University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Radiation resistance from a theoretical view point

B Long time materials performance - theoretical

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Irradiation resistance predictive modelling

B Multi scale modelling

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Randy Nanstad PITBI

ORGANISATION/INSTITUTION: Nuclear materials science and technology group materials science and technology division Oak Ridge National Laboratory

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Structural materials wide range of materials science capabilities, including test reactor (HFIR), hot cells microscopes, etc

B Modelling and micro structural expertise atomistic M.D., kinetic – multiscale for structural, rad. Effects, fuels etc

I NEED HELP with the following research gap(s) or need(s):

A IASCC experiments and modelling

B Data and materials for examination at high fluence / both low and hi flux to facilitate modelling prediction of RPU embrittlement to soy

I CAN (most likely) HELP with the following research gap(s) or need(s):

A irradiation and testing irrad. Matls, high temperature test facilities

B Link mechanistic modelling, theory with experimental. Modelling simulation.

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Paul Wilson
ORGANISATION/INSTITUTION: Wisconsin
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Reactor Physics B Fuel cycle analysis
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Fuel cycle analysis B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Steve Donnelly
ORGANISATION/INSTITUTION: University of Salford
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A unused / under used hot facilities (UK gap/deed) B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: A Navrotsky
ORGANISATION/INSTITUTION: UC Davis
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Thermodynamic cabizinatys solid state chemistry B Adv fuel cycles – John Lee (modelling)
I NEED HELP with the following research gap(s) or need(s): A Samples B Atomistic modelling
I CAN (most likely) HELP with the following research gap(s) or need(s): A Thermodynamic of waste forms, elements inenfonaton ned damage also si cardin area 1 B

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Graham Fairham

ORGANISATION/INSTITUTION: UKNNL

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Environmental risk assessment approach

B Fixation of radioactive species in cad/buildings

I NEED HELP with the following research gap(s) or need(s):

A Consistent approach to defining risk based end points
B Remediation techniques (in Situ)

I CAN (most likely) HELP with the following research gap(s) or need(s):

A UK methodology for contaminated land BPEO
B Modelling of radioactive species transport e.g. TC, SR

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: Jason Hayward (jhayward@utk.edu)

ORGANISATION/INSTITUTION: University of Tennessee oak Ridge national Lab

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Safety security and safeguards

B

I NEED HELP with the following research gap(s) or need(s):

A Identify high priority needs for nuclear data relevant to safeguards and security
B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Design of detectors and images for nuclear security and safeguards/ advanced radiometrics for SNM detection

B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Bill Martin
ORGANISATION/INSTITUTION: University of Michigan
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Radiation damage to cladding and structural materials (WAS) B Fuel Performance modelling (WAS)
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Thermodynamic phase charge modelling B Fuel cladding perf in RX env

POSSIBLE COLLABORATION …	GROUP 2 YELLOW

NAME: Audeen Fentiman (For Colleagues)
ORGANISATION/INSTITUTION: Purdue University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Materials performance under extreme conditions B Construction engineering management
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Materials development and testing B Modelling and simulation

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Sherrell Greene
ORGANISATION/INSTITUTION: ORNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Reactor design ops B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A MSR, AHTR, GCR concept dev. IiC? Diagnostics. B Small LWR dev. Thermal hydraulics

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Simon Biggs
ORGANISATION/INSTITUTION: Leeds University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A long term behaviour of cements and grants (PI: Ian Richardson) B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A unused / under used hot facilities (UK gap/deed) B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Ram Devanathan

ORGANISATION/INSTITUTION: Pacific Northwest national Lab (PNNL)

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Waste forms(experiment and modelling) Dennis Strachan(PNNL) John Vienna (PNNL)

B Modelling of fuels and structural materials Ram Devanathan

I NEED HELP with the following research gap(s) or need(s):

A bridging the scales of the problem – going from atomic level to macroscopic level

B Develop methods to include electronic excitation effects in radiation damage models

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Ion implantation and analysis facilities POC: Dr Yanwen Zhang yanwen.zhang@pnl.gov

B Inter atomic potential development for multi-component systems POC: Ram Devanathan ram.devanathan@pnl.gov Experimental studies of waste forms POC Dennis Strachan

POSSIBLE COLLABORATION …	GROUP 6 BLUE

NAME: Becky Lunn

ORGANISATION/INSTITUTION: University of Strathclyde

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Public perception of risk and uncertainty (to date using examples from flooding and climate change)

B

I NEED HELP with the following research gap(s) or need(s):

A Appling methodology to nuclear engineering including waste management and disposal
B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A public perception of risk/decision making a based on uncertain science
B

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: Jerry Fairley

ORGANISATION/INSTITUTION: University of Idaho

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Multi phase flow and heat transport modelling

B Site characterisation of heterogeneous sites modelling and characterisation of thermally-driven systems

I NEED HELP with the following research gap(s) or need(s):

A Instrumentation and sensor development for monitoring in high temperatures and /or corrosive environments
B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Field support and input for sensor design

B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: John Ireland – Ken McClellen (POC)
ORGANISATION/INSTITUTION: Los Alamos
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Fuel technology – oxides and Pu bard fuels B Fuel performance codes
I NEED HELP with the following research gap(s) or need(s): A Data B
I CAN (most likely) HELP with the following research gap(s) or need(s): A High performance computing – cetin, Unal, (POC) B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Brent Heusen representing colleagues
ORGANISATION/INSTITUTION: University of Illinois @ Urkana - champongy
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Neutronics & thermohydraulics modelling B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Simon Biggs (POC)
ORGANISATION/INSTITUTION: Leeds University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Solid – liquid waste systems amnagement B Modelling of solid - liquid systems (CFD, DEM)
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Mike Goff
ORGANISATION/INSTITUTION: Idaho National Laboratory
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Non aqueous processing technology pyro processing B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Capabilities from bench to pilot scale far pyno processing of metal fuel – currently fast reactor fuels with sodium boading B

POSSIBLE COLLABORATION …	GROUP 6 YELLOW

NAME: Kostedin Ivanov / Sevnggin Kim PI
ORGANISATION/INSTITUTION: Penn State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Modelling and code benchmaking of neutronic / TH codes B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Modelling capability (fundamentally bases) of non-designed based accidents and transients B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Andy Klein
ORGANISATION/INSTITUTION: Oregon State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Crud modelling and fuel performance simulation POC: Andy Klein B Fuel performance codes
I NEED HELP with the following research gap(s) or need(s): A Crud model development/data evalulation B
I CAN (most likely) HELP with the following research gap(s) or need(s): A B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: T Toteu
ORGANISATION/INSTITUTION: ANL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Development of probabilistic safety assessment models B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Development of probabilistic thermal – hydraulics and safety analysis models B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Ian Farnan POC/PI

ORGANISATION/INSTITUTION: University of Cambridge Earth Sciences

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Local structure in complex materials – kadiation damage in waste forms and fuels

B Aqueous durability waste forms – combination of A and B

I NEED HELP with the following research gap(s) or need(s):

A Access to radiological samples prep & characterisation facilities

B propagation into higher scale models (of atonistic/mechanistic date) using thermodynamic/reactive transport techniques – uncertainty quantification methods

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Element specific spectroscopy of waste forms and fuels U and Th only (non irradiated)

B Quantification of radiation damage calibration of models / MD simulations (protonation). Quantification of waste form and leautate in aqueous durability expts

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Andy Klein
ORGANISATION/INSTITUTION: Oregon State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A radio chemistry and chemical separations POC: Alena Pavlenova B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Chemical separations of small quantities of activides B

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: Ram Devanathan
ORGANISATION/INSTITUTION: PNNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Modelling of phase development in irradiated fuel B Modelling radiation damage of fuel
I NEED HELP with the following research gap(s) or need(s): A Linking atomistic studies to finite element models B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Phase development in irradiated fuel POC: Shenyang Hu Shenyang.hu@pnl.gov B Modelling radiation damage of fuels POC: ram-devanathan@pnl.gov

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Jason Hayward (jhayward@utk.edu) Wes Hines jhinesz@utk.edu

ORGANISATION/INSTITUTION: University of Tennessee Oak Ridge National Lab

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Reactor design, ops, monitoring

B

I NEED HELP with the following research gap(s) or need(s):

A
B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Data validation, online monitoring of disjoints (Hines) data, and nuclear materials diversion in nhc facilities

B Real time in-core sensors for high temp, high flux environments (Hayward)

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Graham Fairhall
ORGANISATION/INSTITUTION: UK NNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Waste Immobilisation B irradiation metal fuel behaviour
I NEED HELP with the following research gap(s) or need(s): A performance / corrosion of U fuel in immobilisation matrix B U Species in high PH environment
I CAN (most likely) HELP with the following research gap(s) or need(s): A Novel waste forms for reactive waste B Spent fuel treatment / separation

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Ken Nash
ORGANISATION/INSTITUTION: Washington State University (Chemistry)
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Actinide solution Chemistry B Aqueous separation / fuel ruprocessing
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Radio chemistry facilities (fnoces up to mg of trus) B Advanced Fuel cycle (separations). Actinide solution chemistry Thermodynamic and kinetics

POSSIBLE COLLABORATION …	GROUP 1 YELLOW

NAME: POC Sandarstan K Loyalka (also covering for colleagues)
ORGANISATION/INSTITUTION: University of Mo Columbia
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Fuel fission gen transport and heat transent B Multi physics / multi scale modelling
I NEED HELP with the following research gap(s) or need(s): A If (fuel technology: advances and alternative fuels: computation) B Ic (fuel technology: fuel performance codes)
I CAN (most likely) HELP with the following research gap(s) or need(s): A Advance computations B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Sherrell Greens POC
ORGANISATION/INSTITUTION: ORNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Nuc. Fuel performance. Multi scale /multi physics B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A NUC. Fuel performance modelling B NUC. Fuel performance fuel testing

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Neil Hyatt

ORGANISATION/INSTITUTION: University of Sheffield

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Waste form design processing characterisation and performance evaluation – inc. glass ceramics, cement. Expertise in pu disposition im particule

B Acoustic emission spectroscopy applied to remote sensing of waste form evolution e.g. cracking, volume expansion

I NEED HELP with the following research gap(s) or need(s):

A Ion implantation techniques to simulate radiation damage in materials, computational modelling techniques applied to simulate radiation damage

B Advanced term and surface analysis techniques applied to study corroded waste form materials

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Waste form expertise for source fenn input into transport modelling

B Samples for thermodynamics studies of elements incorparation in waste form

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Jerry Fairley
ORGANISATION/INSTITUTION: University of Idaho
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Multiphase flow and heat transport modelling B Site characterisation and geostatistical analysis of field data for heterogeneous sites
I NEED HELP with the following research gap(s) or need(s): A Access to field sites (surface and underground)to test models and characterisation methods collaborators with expertise in chemistry for THC and THMC modelling of complex geological systems (thermal hydro chemical and thermal hydro mechanical chemical) B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Numerical simulation, geo statistical analysis, uncertainty analysis B Site characterisation program design and data collection / analysis. Hydrologic, thermal, and thermal – hydrologic modelling

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: (Point of Contact) Ian Hutchinson
ORGANISATION/INSTITUTION: MIT
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A MIT reactor 5MW with fluxes comparable to LWR, internal loops for research testing B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Coolant chemistry & other future reactor research requiring in-core loops etc B NUC. Materials & fuel testing in small scale reactor (Gateway to TR research through prototyping)

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Robin Grimes

ORGANISATION/INSTITUTION: Imperial College London

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Phosphate waste forms for chloride and activite based waste forms

B The structures of glass – crystal interfaces and segregation of species to these interfaces

I NEED HELP with the following research gap(s) or need(s):

A Experimental thermodynamics of waste form behaviour

B Experimental verification of interface structures

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Utilization of waste

B Transport modelling

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Greg Stormbury 208.526.1241
ORGANISATION/INSTITUTION: Idaho national Laboratory
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Multi phase modelling B Site Characterisation
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Numerical modelling of multi phase B Site characterisation

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Per Peterson (Wirth, POC)
ORGANISATION/INSTITUTION: UN Berkeley Department of Nuclear Engineering
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Thermal hydraulics analysis of molten salt cooled reactors, including scaled & integral experimentation B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Development of high temperature reactor designs B Development of optimal integral experiments

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Paul Howarth

ORGANISATION/INSTITUTION: UK NNL

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Fuel cycle analysis

B Modelling and simulation

I NEED HELP with the following research gap(s) or need(s):

A Standard nuclear data and integrated codes for fuel cycle assessment

B Flow sheet data

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Access to UK codes and hisnris fuel cycle inventory database

B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Tunc Aldemir (PITBI)
ORGANISATION/INSTITUTION: Ohio State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Modelling of Multi phase transport B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Modelling of multi phase transport B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: John Ireland – POC
ORGANISATION/INSTITUTION: Los Almos
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Reaction design ops & mondring B Thorism fuel cycles small LWR's
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A UQ & V&V – Cetin Unal (POC) B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Colin Boxall

ORGANISATION/INSTITUTION: Lancaster University

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Novel analytical methods and sensors. Novel membrane for separation and dialysis electro osmosis.

B Urex and novel reprocessing routes. Chemical / hydrodynamic kinetic modelling

I NEED HELP with the following research gap(s) or need(s):

A Thin film fabrication at T<500c (ceria, urania, titania)

B Calorimetry for water absorption at ceria etc surfaces

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Chem reaction transport

B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Joonhong Ahn / Wirth, POC
ORGANISATION/INSTITUTION: UC Berkeley, Department of Nuclear Engineering
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Computational modelling and analysis of geologic repository performance B Multi physics simulations of radio nuclick transport in geologic settings
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Numerical modelling of multi phase transport at multi scales in highly heterogeneous porons materials B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME: Kostadin Ivanov
ORGANISATION/INSTITUTION: Penn State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Generic maths approaches to multiscale modelling B Coupled codes for neutronic/thermal hydraulic. Benchmarking of codes
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A See above in expertise B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: George Smith
ORGANISATION/INSTITUTION: Oxford University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Materials Characterisation B
I NEED HELP with the following research gap(s) or need(s): A"Harvested " samples B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Atomic – scale micro structural and compositional changes – quantitive measurements B

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Ken Nash (Contact) Nathalie Wall (PI)

ORGANISATION/INSTITUTION: Washington State University (Chemistry)

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Environmental actinide Chemistry

B

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A Inert atmosphere capability to mimic Rep

B Radiological lab facilities

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME Ihor V Bodnhr
ORGANISATION/INSTITUTION: Argonne National Lab
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Multi scale modelling (ANL) B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A General, mathematical approaches to multi scale modelling (PI Ron Faifish, POC – Bodnar) B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Graham Fairhall
ORGANISATION/INSTITUTION: UK NNL
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Steel corrosion in high radiation environment in bow PH B Chemistry of high level waste
I NEED HELP with the following research gap(s) or need(s): A Radioactive species in HLW that effect corrosion B Ability total representative samples from with radiation plants
I CAN (most likely) HELP with the following research gap(s) or need(s): A Aging of complex HLW – physical/chemical properties B Modelling of heat generating tank storage problems

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Audeen Fentiman
ORGANISATION/INSTITUTION: Purdue University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Environmental waste management B Storage and disposal
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Skills, training and education B public understanding

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME Mark Anderson/ Mike Corradini
ORGANISATION/INSTITUTION: Wisconsin
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Heat transfer / fluid flow B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Loop testing (water, co2, sodium, molten salt) B

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Martin Newby PITBI

ORGANISATION/INSTITUTION: City University London

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Stochastic modelling: aging and degradation processes in life cycle models from concept to end of life

B Decision modelling for process management. Uncertainty elicitation (subjective) and uncertainty propagation

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A System and process monitoring linking anitical characteristics to operational and management decisions PRA

B Uncertainty quantification and management

POSSIBLE COLLABORATION …	GROUP 4 YELLOW

NAME: Jason Hayward (haywardjp@ornl.gov)
ORGANISATION/INSTITUTION: Oak Ridge National Lab University of Tennessee
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A SNF and waste management B
I NEED HELP with the following research gap(s) or need(s): A B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Facilities for safeguards related characterisation studies (coupled end to end demonstration) solid / aqueous form B

POSSIBLE COLLABORATION …	GROUP 3 YELLOW

NAME Tunc Aldemir (POC)
ORGANISATION/INSTITUTION: Ohio State University
MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE: A Probabilistic risk assessment, uncertainty propagation in non-linear and systems B Instrumentation /untrol
I NEED HELP with the following research gap(s) or need(s): A Financial risk modelling B
I CAN (most likely) HELP with the following research gap(s) or need(s): A Dealing with debelesthie in I & C Systems B Wireless technologies. Propagation of risk in long term. UQ for all surries of uncertainties

POSSIBLE COLLABORATION …	GROUP 4 BLUE

NAME: Marcelo Sanchez

ORGANISATION/INSTITUTION: University of Strathclyde

MY (or my institution's) MAIN AREA(S) OF RESEARCH EXPERTISE:

A Modelling – thermo – hydro – mechanical – chemical models for design of backfill materials and bentonite seals

B

I NEED HELP with the following research gap(s) or need(s):

A

B

I CAN (most likely) HELP with the following research gap(s) or need(s):

A backfill design and THMC modelling of days

B